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697 Heating

"RICHMOND"

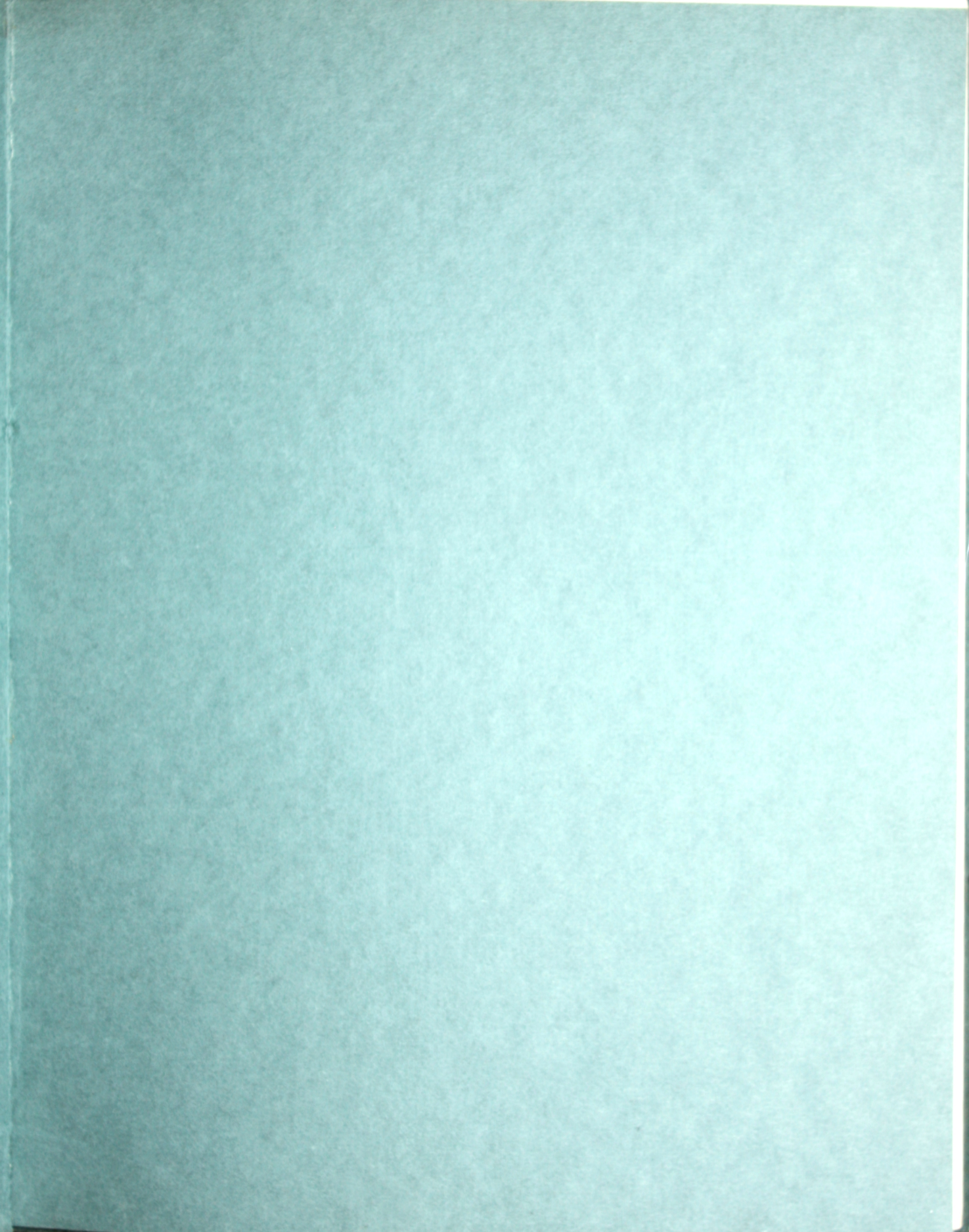
BOILERS
RADIATORS

THE M^CCRUM-HOWELL Co.

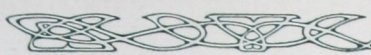
NEW YORK

"RICHMOND"

RADIATORS
BOILERS





 "RICHMOND" 

697 heating

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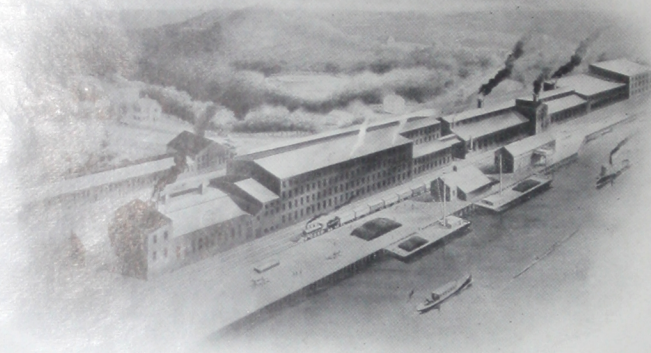
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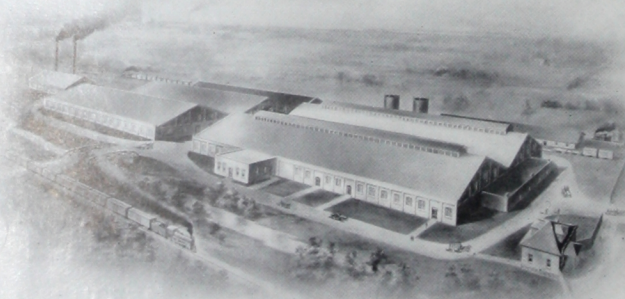
THE McCRUM-HOWELL Co.

PARK AVENUE and 41ST STREET
NEW YORK

"RICHMOND"



Norwich, Conn.



Uniontown, Pa.

INTRO

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INTRODUCTION

"RICHMOND" Boilers and Radiators have been before the public so many years that introductory remarks are unnecessary except to those who are making a study of heating for the first time.

Not only has the "RICHMOND" the distinction of being the pioneer among Boilers, but it has the added merit of being the most modern, embodying every real improvement attained in boiler construction.

The enviable reputation the "RICHMOND" has attained through progressive manufacturing methods explains why thousands are now in use throughout the United States, giving perfect satisfaction in ease of operation, economy in fuel consumption, and in results obtained, bearing out the claim that "RICHMOND" Boilers and Radiators are unequalled in quality and workmanship, and have become the standard of efficiency.

An expression of appreciation is due and the obligation acknowledged to the users, contractors, architects, and engineers who have so generously endorsed the "RICHMOND" Product.

THE McCORM-HOWELL CO.

"RICHMOND"



"Richmond" Steam Boiler
Round

"RICHMOND"

OUR PURPOSE

In compiling these pages we have aimed to make them of service to all interested in the installation of heating apparatus in new buildings or in old ones now inadequately warmed by old-fashioned furnaces or stoves. Not only residences, but all kinds of private or public structures, for commercial or manufacturing buildings, whether schools, churches, stores, offices, theatres, hospitals, factories, depots, greenhouses, etc.

It is generally understood that it is quite an easy matter to install heating apparatus in a new building. Somehow the impression has been gained that old buildings, particularly residences, cannot be equipped with apparatus without tearing down walls or partitions, ripping up floors, thus creating dirt, confusion, and annoyance to occupants of premises.

YET OLD BUILDINGS CAN BE EQUIPPED AND HEATED AS EASILY AS NEW ONES with "RICHMOND" steam and hot water heating apparatus.

The standard of home comfort has been raised by "RICHMOND" Radiators, for they provide uniform heat, easily and perfectly controlled in every room in the building. They require no more caretaking for an entire building than a stove in a single room; ash dust, smoke, coal gases, and soot are confined to the cellar, never reaching the living rooms. This one feature alone materially reduces the labor of house cleaning and effects a great saving in wear on carpets, tapestry, decorations, and furnishings.

"RICHMOND" heating apparatus is a luxury because it affords protection to health and brings comfort and good cheer. It is economy in that it saves work, coal-dust, and dirt, and effects a fuel saving over the old-fashioned methods of stove and furnace heat. It is a dividend earning investment in that not rusting or wearing out, it outlasts the life of the building itself. Property equipped with a "RICHMOND" apparatus will bring in the open market the full cost of its installation; if rented it will bring a higher rental of 15 to 20 per cent; if occupied by the owner it will pay for itself by the saving in cost of fuel over that required by furnace or stove. Heating by steam or hot water is not alone for owners of stores, offices, or mansion, nor for public buildings such as schools, hospitals, and churches, but to-day is now within the easy reach of the owner of the humblest cottage.

Buildings, whether large or small, no matter where situated, or for what purpose used, can easily be healthfully and economically heated by the "RICHMOND" Boilers and Radiators.

"RICHMOND"

Buildings without basements are as easily equipped with "RICHMOND" Boilers as are the structures with basements. A "RICHMOND" Boiler can be placed in any convenient or spare room and radiation may be placed on the same floor level with it. The boiler occupies but little floor space even in a 12-room house, while the piping which supplies the radiators is small and located against the wall and close to the ceiling.

"RICHMOND" Boilers burn anything that is combustible — coal, even screenings, wood, coke, gas, or oil. Any fuel generates heat in a "RICHMOND" Boiler.

The selection of a heating system confronts the average home owner but once in a life-time, while fuel and maintenance are annual problems. Great care is needed to make a selection of a boiler that will meet all demands that are made upon a heating apparatus. Fuel is one item, and care another. In the economy of these important requirements "RICHMOND" Boilers stand at the head of the list.

To those who are hesitating to install a heating apparatus because of the expense involved, it will be a pleasure to submit gratis, through the nearest dealer, an estimate as to the cost of installing a steam or hot water heating system with "RICHMOND" Boilers and Radiators, demonstrating by indisputable figures that the "RICHMOND" product is within their means; not an expense, but a dividend earning investment.



Old Buildings can be Heated as Easily as the New

"RICHMOND" SYSTEM

The complete heating apparatus, steam or hot water, consists of the boiler, radiators, valves, air valves and other appliances.

The boiler, being the "heart" of the apparatus, much of the success or failure of the entire plant depends upon it. If the boiler is right there follows economy in fuel and satisfaction to the owner. Although the boiler is the most important organ of the system, its greatest efficiency can only be realized by the proper installation of all the other appliances. Just as the heart in the human body depends upon the proper condition of the other organs in order to best perform its highest function, so the boiler, the heart of the heating system, gives its best service when every other part of the apparatus is up to its highest standard. As manufacturers, we from the very first realized the importance of making each heating apparatus perfect not only in boilers and radiators, but in all the other appliances that enter therein. We therefore turned our attention to the perfection of the "RICHMOND" appliances, which, with Boilers and Radiators, comprise the "RICHMOND" System. The result is a system complete in every detail and unequaled by any other on the market.

Many good Boilers and Radiators have been condemned and in some cases removed from buildings because of imperfect air valves or other fittings. Every "RICHMOND" Boiler and every "RICHMOND" Radiator is tested, each casting separately, then as a whole, to eighty-five pounds hydrostatic pressure. Every valve, every air valve, and every appliance or device supplied by us is carefully examined and tested. Then when properly installed each part is guaranteed to be the best of its kind — perfect.

In the selection of the boiler and the radiators, the greatest diligence and care should be exercised. And the same discrimination in the selection of accessories insures a heating system complete and perfect in every detail. In specifying the "RICHMOND" System, one will secure the best that study, practice, science and money have perfected.

The "RICHMOND" Systems are sold only to dealers about whose competency, reliability and practicability sufficient evidence has been secured, so that they can be recommended without question to those who are contemplating the installation of heating apparatus.

By virtue of the attractive and compact design of both boilers and radiators, the "RICHMOND" System is continually specified by leading architects and engineers and installed by the best heating contractors.

"RICHMOND"

THE "RICHMOND" PRODUCT

"RICHMOND" Boilers and Radiators embody every real improvement that is known to heating science and possess many exclusive features.

The raw material used in the construction of "RICHMOND" Boilers and Radiators, is chemically analyzed, the mixture of ores, being prepared according to a special formula, and every stage of the process of manufacture is carefully watched by men who are experts in their various lines. The boilers and radiators are examined in the various units, then tested as a whole under eighty-five pounds hydrostatic pressure. A certificate of such test is furnished free upon request.

"RICHMOND" Boilers, in every detail, embody the requirements of the perfect house-heating boiler. The heating surface is so placed that both the flame and heated gases strike it at right angles, thereby utilizing the maximum amount of heat. In the interior surface all parts are so arranged that they are easily accessible for cleaning, thus securing the highest efficiency of the heating surface. Every inch of fire surface in "RICHMOND" Boilers is so backed by water that it readily absorbs the full heat and circulates it through the hollow double walls of the boiler and on through the piping to every part of the system. Because water surrounds every portion of the surfaces with which fire or heated gases come in contact, and because the construction is such that the greatest amount of surface is so placed as to be in contact with the fire or heated gases, the "RICHMOND" Boiler is the most economical on the market in fuel consumption, easiest to operate, and of the highest heating efficiency. It is also practically indestructible.

"RICHMOND" Boilers are portable. The sections, headers and other parts of the largest boilers are of such dimensions that they can be taken into any building through ordinary doors or windows.

No cumbersome brick is required. It is not necessary to give up valuable space in basement as in the case of a steel or wrought-iron boiler set in brick work.

"RICHMOND" Boilers are easy to operate because they maintain a fire which lasts many hours, and which can easily be kept up over night. In ninety per cent of homes heated by steam or water the heating apparatus is left in charge of the good housewife, the grown boy, or the servant girl. Realizing this, the "RICHMOND" Boilers are so constructed that an experienced fireman or janitor is not needed to operate them.

"RICHMOND"

The card of instructions furnished with each boiler enables any one to operate the apparatus with greater ease and with less attention than is needed for the ordinary heating stove.

"RICHMOND" Boilers do not constitute a menace to life, limb or property. There is no inherent danger in them and none can come from neglect or abuse. As they cannot explode, their very construction makes them positively and absolutely safe in every respect.

For the above reasons, buildings heated by "RICHMOND" Boilers, are free from the risk of fire. The boiler, the radiators, as well as the piping, cannot communicate fire—it can only come from the outside causes. "RICHMOND" Boilers and Radiators are of such durable construction and the safety features of "RICHMOND" Boilers are so marked, that a lower insurance rate is possible upon all buildings heated by them.

"RICHMOND" Boilers and Radiators are guaranteed, under proper installation, to carry their rated capacities. These ratings are based on the proviso that the radiation supplied is ample to heat the building which is to be provided with a flue of sufficient capacity, and that the apparatus receives proper care and attention.

UNIFORM HEAT

Buildings equipped with "RICHMOND" Systems are heated uniformly throughout, even in the nooks and corners.

The old fashioned furnace—and the last possible improvement in furnaces was made a score of years ago—heats only the apartments that are favored by not having the wind blowing against them; while the fuel eating stove bakes anything and everybody within reach of its direct rays, and beyond them frost is king.

The uniform heat of "RICHMOND" Apparatus makes possible a system of ventilation that brings health to the invalid, vigor and strength to delicate women and growing children, and to all, even the old and feeble, comfort.

When the unpreventable siege of illness does come, a "RICHMOND" System, by its uniform heat, and method of ventilation that avoids the direct draft—brings cheer, comfort and improvement of the unfortunate sick one.

Make the entire home accessible the year round. Let a "RICHMOND" System continue summer into winter by its uniform heat.

MATERIAL AND CONSTRUCTION

Cast iron possesses greater durability than steel or wrought iron. Corrosion does not affect it, nor does the chemical action of the gases of combustion when exposed to intense flame. Cast iron is of great tenacity and is of porous, granular structure, permitting the most rapid transmission of heat units from fire to water.

"RICHMOND" BOILERS ARE MADE OF CAST IRON. The danger from explosion in a "RICHMOND" Boiler is no greater than in a tea kettle. The same stress that might cause a fracture in a cast-iron boiler would undoubtedly cause explosion in a steel boiler. The damage to the steel boiler would be practically total, while the fracture in the sectional "RICHMOND" Boiler would be merely nominal, because the slightest break in any section would act as a safety valve. Steel and wrought-iron boilers are invariably made with crow-foot braces and stay bolts, which are distributed over all parts subjected to pressure or strain. "RICHMOND" Boilers are not so provided. They need no such equipment, as no part is subjected to undue pressure or strain.

Surfaces in "RICHMOND" Boilers are so arranged that from 75 to 80 per cent is fire surface and only 20 to 25 per cent flue surface. The sections of "RICHMOND" Boilers are cast in one piece and when connected up as a whole all joints are outside, away from the direct action of the fire and heated gases. Steel or wrought-iron boilers have many joints in direct contact with the fire and gases, and have only 20 to 30 per cent fire surface with fully 70 to 80 per cent flue surface — an extremely extravagant arrangement when compared with the economical arrangement of "RICHMOND" Cast-Iron Boilers, as given above.

A matter that should be taken into consideration is that of the second or repair cost of a boiler. This is only remote in the "RICHMOND" Boiler, and possible only through gross neglect or positive abuse, but very probable with either steel or wrought-iron boiler, covering, as it does, not only the expense of repairing the boiler itself, but of tearing down the brick work and rebuilding it.

Both steel and wrought-iron boilers deteriorate during the summer months. We quote the following from no less eminent authority than R. H. Thurston: "Wrought iron rusts quickly in damp situations and especially when near a source of carbonic gas; steel is corroded with less rapidity, but cast iron is comparatively little acted upon."

"RICHMOND"

In comparing the respective merits of steel, wrought iron and cast iron it must be borne in mind that "RICHMOND" Boilers are made of cast iron.

"RICHMOND" Boilers are not subject to boiler scale, which not only rusts wrought and steel boilers, but also prevents the free and rapid transmission of heat units from the fire into the water.

"RICHMOND" Boilers, made of cast iron, generally outlast the buildings in which they are installed.



The raw material from which "Richmond" product is made

PRINCIPLE OF STEAM HEATING

Low pressure steam heating is merely the circulation of heated vapor — steam (generated in the boiler) through a system of piping and radiators under a pressure of from one to five pounds. The boiler is filled with water to a level called the water line, which is clearly indicated by the water glass furnished with boiler. This water is boiled and is soon heated to 212 degrees Fahrenheit; at this temperature vapor and particles of steam become separated from the water and rising, find their way through the piping to the radiators. As the steam increases in volume, it also increases in pressure, and under pressure quickly fills the radiators and performs its work in heating the rooms.

"RICHMOND"

When fire is first started, the entire heating system is filled with air. This air must be and is expelled by the steam rising from boiler, and is emitted through air valves located on the various radiators and at the proper places on piping in basement.

The steam in the radiators is the direct means of heating the rooms. Heat is radiated from the radiators into the surrounding air. After thus performing its work, the steam condenses into water, and through the piping is returned to the boiler, where again it is generated into steam — a simple automatic process.

"RICHMOND" Boilers are provided with an attachment which automatically keeps the temperature of the rooms, or pressure of steam at boiler, at any desired point; this attachment automatically opens and closes the drafts.

Supplying the boiler with fuel, removing ashes and occasionally agitating fire by shaker lever or poker, is practically all the work necessary in operating a steam-heating apparatus.

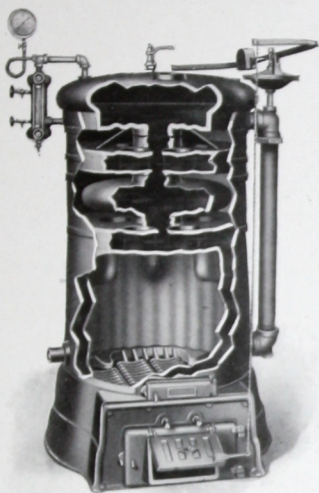
PRINCIPLE OF HOT-WATER HEATING

Water when confined and heated can be said to have two "columns;" one consists of the hot water traveling upward, the other of the cool water descending. This principle is as old as time. Its application, however, to the heating of buildings, is less than half a century old; improved methods during the last generation have made the system of hot-water heating the perfection of excellence.

The fixtures needed are but a few in number — the boiler, the radiators and the piping with the expansion tank, constitute the sum total; with such accessories as go to make the apparatus complete, as radiator valves, thermometer, altitude gauge, and air valves.

The system of operation is simple; the boiler with pipe and radiators is filled to the water level of the expansion tank, which is located above the highest radiator. The heated water is distributed through the piping to the various radiators. The hot water passing through the radiator gives off its heat through the walls of the radiator and radiates it to the surrounding air. As the water cools, it is displaced by warmer water from the boiler, the cooler water flowing downward to the boiler to again make the circuit.

THE CHIEF FUNCTION OF THE BOILER



"Richmond" Round Boiler

The chief function of the boiler is to absorb the heat generated in the fire chamber, and transform it into a medium of energy.

This is accomplished by surrounding and overhanging the fire chamber with hollow, double-walled, water-filled surfaces, which transmit the heat of combustion to the water. The amount of heat absorbed and transmitted to the water will depend upon the area and arrangement of the surfaces in the boiler. The efficiency of the surface in the boiler depends on the rapidity of the circulation of the water, and this circulation depends on the difference in weight of the water in the various parts of the boiler, due to temperature difference. The

water nearest the heating surface backed by fire is heated and rises, while colder and heavier water descends to take its place. The rapidity of the change depends on the difference of temperature of the water in the various parts of the boiler; the greater the difference, the more rapid the change.

In generating steam for steam heating, or heating water for hot-water heating, two columns of water are formed in the hollow double-walled water-contained sections. One column is composed of heated water ascending, the other of colder water descending. Too great a difference of temperature in the two columns involves a strain on the boiler.

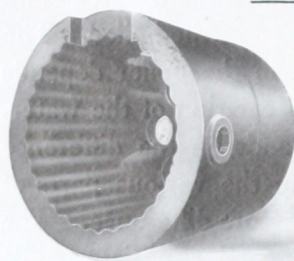
All possibility of strain is avoided in the "RICHMOND" Boiler, because the water circulates in one direction without interfering currents. Water from returns is evenly distributed to each section of the boiler, thus preventing unequal expansion and contraction and unequal strain. The water is divided into many thin, small streams, effecting a rapid circulation over the heated surfaces in the boiler, keeping them from becoming overheated, and instantly transmitting the heat to every part of the boiler, so that the surface in the entire boiler is at nearly an even temperature.

"RICHMOND" ROUND BOILERS

For Steam and Hot-Water Heating

DESCRIPTION

THE SEVERAL SECTIONS. The several sections, including the firepot, are hollow-walled, within which is contained the water of the boiler. Every inch of fire surface is backed by water, which quickly absorbs the full heat and circulates it through the entire system. Protected by water, as is every portion of the fire surface, no part of it can be burnt or worn out. This makes the



The Firepot

"RICHMOND" Boiler the most durable of its kind. The surfaces backed by water are so placed that the flames and heated gases come in contact with a greater area of surface than in any other boiler, making them the most economical in the consumption of fuel.

THE FIREPOT. The firepot is deep, permitting the carrying of a large and adequate quantity of fuel under slow combustion; it also provides ample space or combustion chamber above the fuel line for the proper ignition of gases from coal. This insures a saving in fuel. The firepot is provided with overhanging surfaces starting on a line about the center of the feed door opening and extending to the crown sheet directly over the fire, materially increasing the fire surface and insuring the highest efficiency. The firepot is corrugated, providing free circulation of air at the edge of the fire, thus insuring good combustion there as well as in the center. The corrugated firepot has of course more surface than the uncorrugated. The firepot is also tapered; the walls inclining inward at the top, make the surface more sensitive and active, as it inclines directly over the fire and comes in contact with flame and heated gases in their ascent. The top of the firepot instead of being open like a kettle, as in many other types of boiler, is provided with a crown sheet. This has flue openings for the travel of flame and heated gases. Being entirely over the fire, the crown sheet is the most effective surface in the boiler. Thus the crown sheet, together with the corrugated sides and overhanging surfaces, makes the "RICHMOND" Boiler the best in the market.

SECTIONS ABOVE FIREPOT. "RICHMOND" Boilers are provided with one or more sections above the firepot to suit the special requirements as to

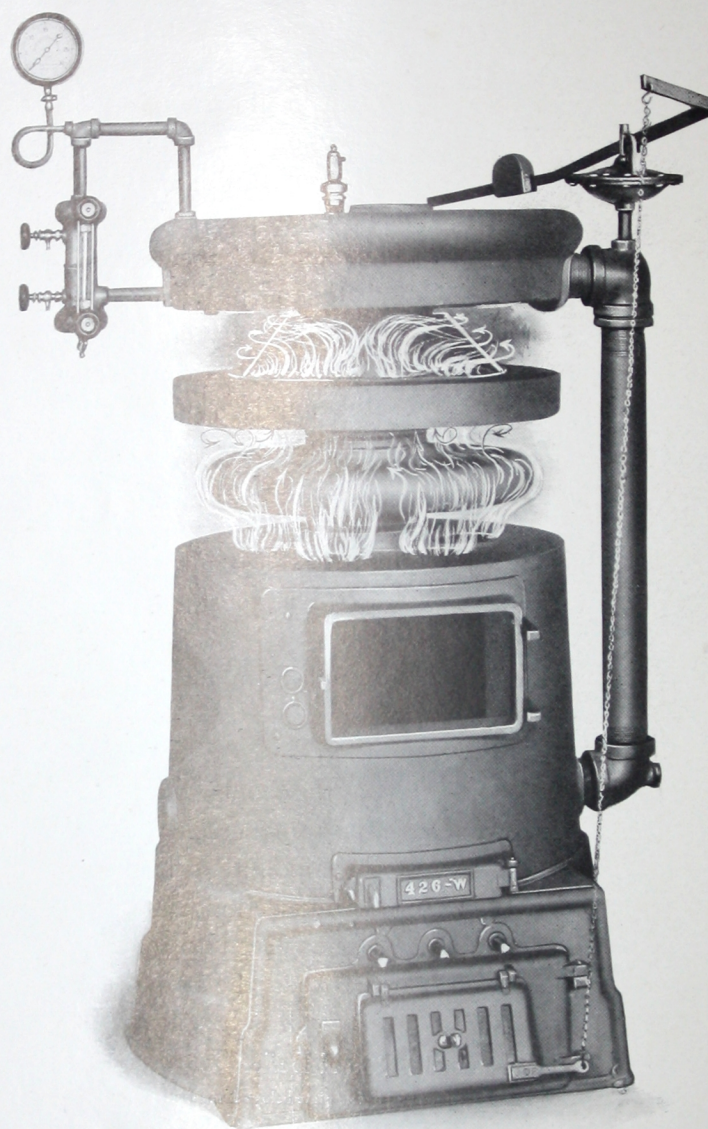
"RICHMOND"



"Richmond" Round Boiler

Showing arrangement of sections and baffle plate below dome section

"RICHMOND"



"Richmond" Round Boiler
Showing arrangement of sections, and fire travel

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The "Carwheel" Section

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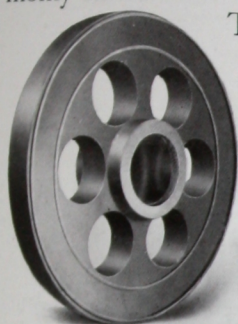
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The Dome Section

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capacity, draft or system. On this and the following page are shown the several sections, all of which are hollow-walled and contain water. These are commonly called "cartwheel sections," "deflecting sections" and "dome sections."



The "Cartwheel" Section

The several sizes of boilers are made up of one or more of these sections, as shown in illustration on opposite page.

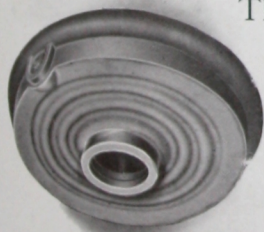
The "cartwheel" section is provided with round flue openings for the travel of the flame and heated gases. These flue openings are not placed directly over the flue openings in the crown sheet of the firepot, but in staggered position, requiring the products of combustion to travel right and left, making every portion heat-absorbing surface.

The "deflecting" section is a hollow-walled casting, containing water. It differs from the "cartwheel" section in that it is without flue openings, being practically a second crown sheet. It is smaller in diameter than the "cartwheel" and firepot sections, requiring the products of combustion in their ascent to pass around its sides and over it. Next to the firepot this "deflecting" section is one of the most powerful agencies for heat absorption.



The Deflecting Section

The "dome" or top section is different from any other manufacture. Its under surface is deeply corrugated, materially increasing its efficiency as a heat-absorbing section. Instead of having the smoke outlet taken out of the center of this important section of the boiler and thereby decreasing the amount of heating surface, the dome in the "RICHMOND" Boiler is one solid section without flue opening.



The Dome Section

The smoke outlet in the "RICHMOND" is taken off the rear of the boiler between the two top sections, thus saving the surface which is lost in other boilers.

The dome sections of the "RICHMOND" Boilers are not the same for steam and hot water heating. Perusal of the catalogs descriptive of other boilers, clearly indicates that the same dome section is used in either steam or water boilers. This is wrong construction, due to the

desire of the manufacturer to save the cost of extra patterns and equipment necessary to produce dome sections for the varying conditions of steam and water heating. The dome section for hot water heating should be shallow and

"RICHMOND"

contain only a small volume of water between its walls: the dome for steam heating should be deeper, providing sufficient space for water to cover the bottom surface and also with ample space for the free and easy separation of steam from water and its free circulation without foaming or lifting water into steam mains. The manufacturer who furnishes one dome section alike for steam or water-heating, furnishes either a water dome section too deep or a steam dome section too shallow. The water dome section, if too deep, undoes what the fire is doing, because the water already heated to a high temperature is required to pass through a chamber holding too great a volume of water and cools instead of adding heat in its final circulation through dome to piping. By the shallow dome, as furnished in the "RICHMOND" Boiler for hot-water heating, the chamber in the dome is heating instead of cooling surface and discharges the water into the main at a high temperature. The steam dome section, if too shallow, is a positive detriment to the boiler. It makes it impossible to provide sufficient water to cover the bottom surface which comes in contact with the products of combustion. Nor does it provide sufficient space for the free and easy separation of particles of steam from water. The shallow steam dome section is chargeable with water foaming, lifting water into the steam main, and surging of water in the gauge glass. All these objectionable features have been overcome in "RICHMOND" Boilers by providing separate dome sections for steam and water heating; hot water dome illustrated on page 15, steam dome page 16.

The steam outlet of the "RICHMOND" Boiler is placed at the front of dome section as illustrated on page 16. The connections between the several sections are in the center of the boiler and should any water be lifted with the steam, it cannot pass directly into the steam main or piping as the outlet is at the outer edge of the dome and not over the center connections.

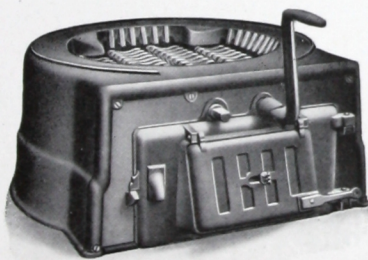
An important feature in the dome of the "RICHMOND" Steam Boiler is the steam baffle plate immediately back of the steam outlet. This baffle plate is an exclusive feature in the "RICHMOND". The plate a part of the dome casting itself, is inside the dome between the upper and lower walls and forms a wall to prevent the steam and any water rising with it, to travel directly from center of dome to steam outlet. The steam in its forward travel, comes in contact with this wall and then passes to the right and left around the plate to the smoke outlet. Any water raised with the steam, on striking this plate will drop, leaving the steam to pass out free and dry through the outlet into the mains.

"RICHMOND"

SECTIONS ARE INTERCHANGEABLE. The different sections are made from templates which admit of any interchanging desired. Should an owner at some future date enlarge his home and require additional boiler capacity, it is possible, unless his boiler already has the maximum number of sections, to add additional sections at nominal expense. The extra sections, although ordered separately, will fit perfectly in place, because made from the same templates. This will save the cost of a new boiler.

IN EVENT OF REPAIRS. While repairs are a very remote contingency, they may be necessary through wilful abuse or gross misuse, and the matter of replacing castings should have consideration. With "RICHMOND" Boilers, should any section above the firepot be damaged, it is not necessary while waiting for repairs to vacate the premises or erect stoves. The damaged section can be removed, the other sections lowered and the heater minus one casting can be used until the repair arrives. Boilers having two or more sections above the firepot have such sections screwed together and tested at the factory, leaving the fitter but one connection to make at the building — the connection between the firepot and the first section. This insures the boiler being tight at the joints and all sections above the firepot properly aligned and easy to fit with smoke hood and panels.

ASHPIT. The ashpit is extra large, cast in one piece so as to give it great strength. It is of sufficient depth to prevent burning out the grates, with an ordinary accumulation of ashes, which, in mild weather, do not require removal but once in 24 hours. Being made of cast iron, it is impervious to rust or corrosion, even if located in a wet or damp basement. The front of the ashpit is provided with a swinging door of large size to permit easy removal of ashes. It is provided with lifting and sliding draft dampers. The lifting damper on steam boilers is operated by an automatic draft regulator, which automatically closes when the steam pressure is raised, and in the absence of pressure leaves draft in a raised position to



The Ashpit

admit air until the increased pressure again causes the regulator to close it. Hot water boilers are not provided with automatic damper regulators, as the water system is without pressure. On hot water systems a connecting chain to lifting door with extensions to first or second floor rooms directly above the boiler, is convenient. In such rooms three hooks, one above the other

"RICHMOND"

and about an inch or two apart, with rings inserted, permit the raising or lowering of the lift door, so the fire can be checked or revived without the necessity of going to the basement. The fire can thus be checked in the evening and opened in the morning, so that in a short time the rooms will be comfortably heated. An automatic regulator is not essential to the operation of the hot water heating apparatus, but where desired, "RICHMOND" regulator can be supplied at a small extra charge. This regulator opens and closes draft doors and dampers without attention. The fire can thus be checked in the evening and the draft opened in the morning. The fire will be bright and the rooms comfortably heated in a short time.

GRATES. The grate bars are triangular revolving bars made of cast iron, heavy and strong enough to support the deepest fire. They have short cast projections or teeth with openings between, permitting the draft to pass the bars on its way to the fire. This free circulation of the air through the bars insures them against warping. The boilers are provided with two or more of these, according to the size of the firepot, and are arranged to shake singly, in pairs, or in threes, according to the diameter of the firepot. This arrangement of several units makes it possible to operate any part of the fire at any time.

The illustration on succeeding page shows the grate in three different positions. The ashpit shows five grates of three units, consisting of one separate center grate and two pairs. Should the fire be dark on one side and bright on the other, the grates on the dark side can be operated independently of those on the other. This is impossible with a grate operated by one lever, with which, if the fire were uneven, both bright and dark sides would have to be agitated at the same time without evening up the condition of the blaze.

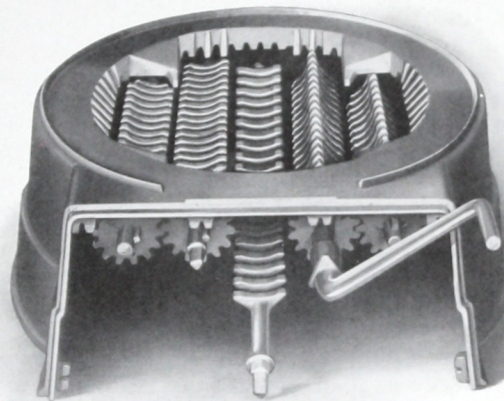
The two left hand bars shown in the illustration on opposite page are operated by one shaker lever. These two bars, when in proper position, are perfectly horizontal, as illustrated. The two right hand bars show how a side movement of the lever separates the grates for breaking clinkers or dumping the fire. When partly revolved, the teeth of one bar grips and breaks the clinkers against the next. When revolved entirely the fire can be dumped into the ashpit. With a slight movement of the lever, right and left, ashes drop through between the teeth of each bar and between the several grate bars.

When the lever shown in illustration on page 19 is in a vertical position, the grates are in a horizontal position for proper firing. The grates are

"RICHMOND"

carefully made and placed in the ashpit at the factory and are easily operated, even by a child.

The grates, as stated, are strong. They should last as long as the boiler and the boiler should outlast the building. Yet should any bar be damaged through abuse or neglect the services of an expert are not necessary. It is not necessary to take down the boiler. By merely removing the front plate of the ashpit one or more grates can be removed and replaced in a few moments. The illustration below shows the front plate removed and the center plate dropped down ready for removal. A new bar is easily slipped



Ashpit, showing grates

into the groove in back, raised in front, ashpit front put in place and the job is completed.

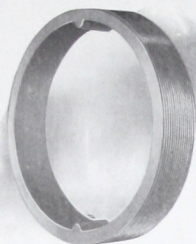
CLINKER DOOR. At the bottom and in front of firepot on a line with grate is provided a clinker door, permitting the removal of clinkers or slicing of the fire with a slice bar when desired, instead of shaking the grate.

FIRE DOOR. The fire-door is placed at proper height in firepot to permit maintaining deep bed of fire. The door is provided with slide for admission of air to fire chamber to ignite gases. It is lined on inside with a heavy cast iron perforated plate, to protect the door from warping.

CLEANOUT DOORS. These are placed in front of the heater between each section and through them every part of the surface is accessible for cleaning or inspection.

"RICHMOND"

NIPPLES. The "RICHMOND" Boilers have no asbestos, rubber or other packing or gaskets nor slip nipples, as used in other boilers. In the "RICHMOND" the connection between sections is made by extra heavy,



The Nipple

machine cut, tapered screw threaded nipples. These joints are in the center of the section, screwed up iron to iron and made tight without lead or packing of any kind. The threaded nipple connection as used in the "RICHMOND" Boilers is the same as that used for high pressure power requirements in U. S. Government work, factories, mills, and on boats where only the best is used. This connection is far superior to the slip nipple type used in some boilers, which depends upon long rods, bolts and nuts for holding sections together. Such rods and bolts are made of wrought iron and the boiler of cast iron, thus the expansion and contraction of the two metals differ and preclude a tight or lasting joint. The paper, rubber or asbestos gaskets used in most boilers are a positive and continual source of trouble, worry and expense. They are made of materials which have no lasting qualities, they cause leaks at the joints and often must be repacked during the coldest winter weather just when heat is most desired. All trouble, worry and expense is avoided by specifying the "RICHMOND", which is the embodiment of the very best.

SMOKE HOOD AND BAFFLE PLATE. The illustration on page 25 is especially intended to show the special feature of the smoke hood and baffle plate. The products of combustion in their ascent naturally follow the shortest route to the smoke outlet and chimney. By the baffle plate they are prevented from taking the shortest cut to the chimney, but are arrested and carried forward under the plate and then backward over the plate, so confining the gases within until every available heat unit is absorbed by the boiler surfaces. The smoke hood being placed at the rear of the boiler effects the saving of many square inches of valuable heating surface in the dome, for if the smoke pipe is taken out of the top of the heater, as is the case in other boilers, the dome section must be cut out for same, losing much of its efficiency as a heat absorbing surface. The hood is provided with a cold air check damper, which permits of control of chimney draft and fuel combustion. The check damper is so placed that the hood can easily be cleaned of soot.

PANELS. The space between sections at the outer circumference is closed by cast iron jacket plates or panels. The jacket panels can be quickly removed and replaced, if desired, a small screw driver only being necessary.

"RICHMOND"



"Richmond" Round Water Boiler
Exterior view

"RICHMOND"

Once each year the boiler should have a thorough cleaning and by removing these plates, this can be better accomplished than through clean-out doors only.

WATER CIRCULATION The circulation in the "RICHMOND" Boiler is unimpeded, and is as rapid as the fire can make it. The large water way provided by the large center nipple connections between sections insures perfect and continuous circulation, a high temperature of water in the hot-water boiler and a guarantee of dry steam and steady water line in the steam boiler.

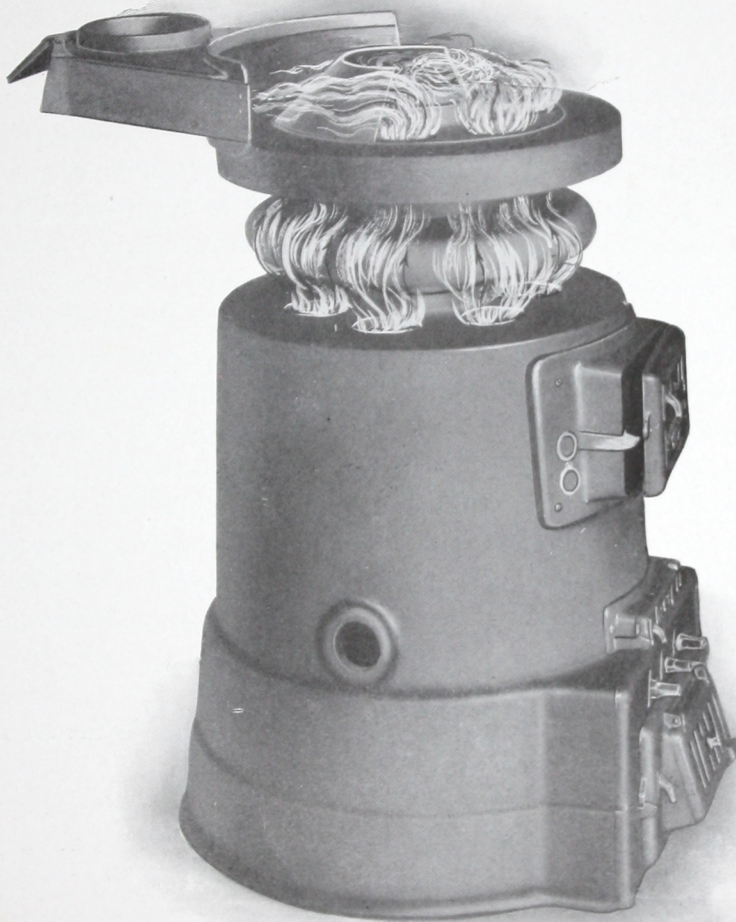
COIL FOR DOMESTIC WATER HEAT. "RICHMOND" Boilers are provided with an opening for the admission of a coil into the firepot for heating water for domestic purposes. The openings are placed in the fire door frame on left hand side, as shown in illustration on next page. Small plates held in place by a screw and bolt cover the opening. If coil is not desired, the plate is left in place. If desired, the plate can be unscrewed and the firepot is ready for admission of the coil.

FIRE TOOLS. "RICHMOND" Boilers are provided with a hoe and poker for firing and with flue brush for cleaning surfaces between sections and the smoke hood.

TRIMMINGS. Hot water boilers are not provided with any trimmings. They are not essential to the successful operation of the apparatus. However, "RICHMOND" water boilers are provided with proper openings for attachment, if desired, of a thermometer and an altitude gauge, which are furnished at a very nominal cost if ordered. The use of a thermometer and altitude gauge is recommended. The thermometer registers the temperature of the water as it leaves the boiler, being a guide for either increasing or checking the combustion. The altitude gauge registers the level of the water in the system and lowering of the water due to evaporation or other cause is shown on the gauge, obviating the necessity of trips to the upper floor to inspect the expansion tank and to the basement to supply additional water. By the use of the gauge, the height of the water can be determined daily while attending the fire and if water is needed it is supplied through a valve near the boiler. The loss of water through evaporation is very little, amounting to only a few gallons during an entire heating season.

Steam boilers are provided with the following trimmings: Steam Gauge, to register the number of pounds of steam pressure carried on the boiler, which averages about 2 pounds on a low pressure steam heating system. A Safety Valve made of brass and set to open at from 10 to 15 pounds. This valve is

"RICHMOND"



"Richmond" Round Boiler, showing smoke box and baffle plate

Baffle plate prevents smoke and gases taking shortest route to chimney. Travel of smoke and gases is forward underneath, and then backward over plate

"RICHMOND"

seldom brought into use, as the steam pressure rarely gets high enough to cause it to open. A Water Gauge, consisting of water column, compression gauges, water gauge glass and guards. The water gauge registers the height of the water in the boiler. An Automatic Draft Damper Regulator, consisting of regulator, lever, weight and chain, which controls the pressure of steam and the combustion of the fire, and automatically opens the draft door in the ashpit and at the same time opens check damper in smoke hood, or vice versa. By placing the weight at different points on the lever, any desired pressure can be maintained — during the day a slight pressure, if desired, and during the night partially or wholly checked. With the steam gauge is furnished syphon and cock, with water column and regulators all pipe cut to exact length and fittings necessary to properly connect same. Draw-off Cock for the purpose of drawing water from the system is also furnished.

FUSIBLE PLUG. All "RICHMOND" Steam Boilers are provided with fusible plug. If water gets below a certain level, the fuse in plug melts and the escaping steam extinguishes the fire; the hissing noise of the escaping steam serves also to notify owner that water is low and supply should be re-plenished.

EQUALIZING PIPE. For steam boilers we recommend the use of an equalizing pipe. Some manufacturers furnish openings for the connections of the the water, the water is more or less agitated, often lifting and dropping to such an extent that it is impossible to determine whether the boiler is supplied with little or much water. It is essential that the water be maintained at the proper level at all times. This is possible only with the large and specially made equalizing pipe furnished gratis with all "RICHMOND" Boilers. The equalizing pipe is on the outside of the boiler and extends from the dome section to the firepot as shown in illustration on Page 13.

STEADY WATER LINE IN STEAM BOILERS. As stated in preceeding paragraph, it is essential that water be maintained at the proper level at all times. Some boilers require more or less attention on this score, but with the "RICHMOND" the level of the water can always be accurately determined. The steady water line is assured by the large water way connections between the sections, by the steam outlet being at the edge instead of the center of the dome, by the equalizing pipe and by the steam baffle plate inside of dome explained on page 18.

FUEL. The construction of the "RICHMOND" Boiler with its deep firepot arrangement of sections, special grate, accessibility for cleaning, permits burning hard or soft coal, including pea coal and screenings, also coke or wood if desired, all with most satisfactory results.

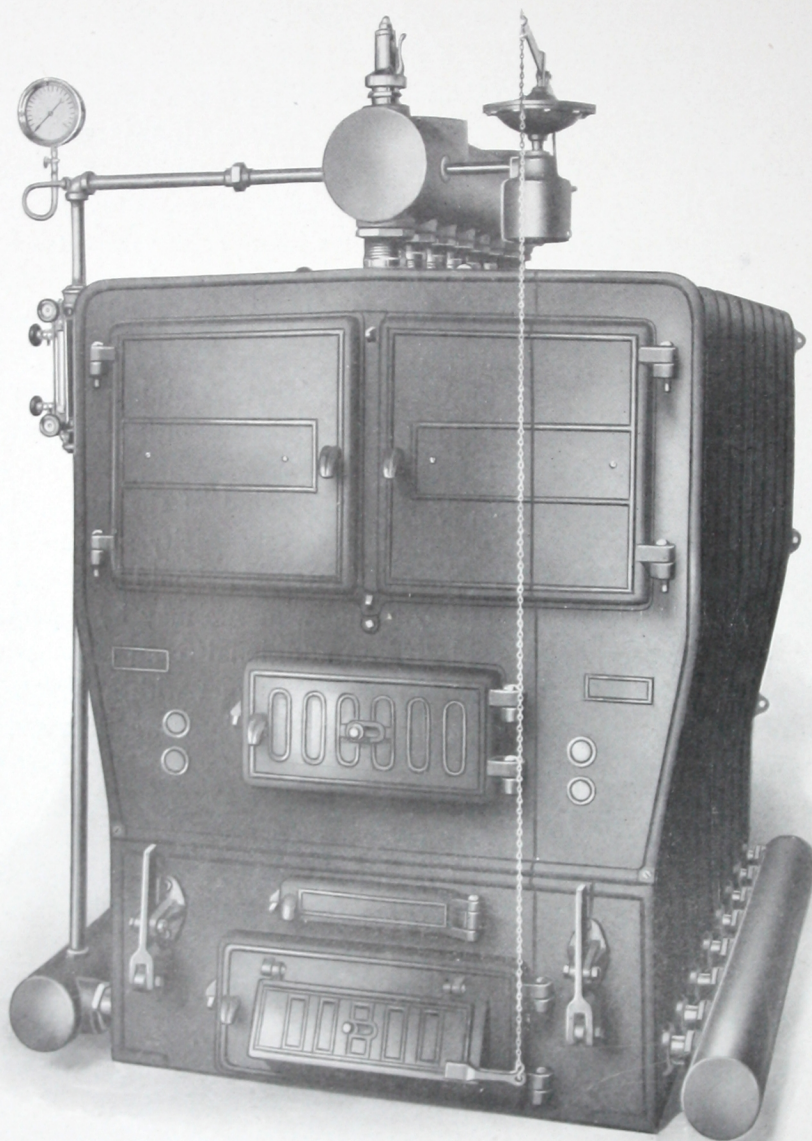
"RICHMOND"

TEST. Each section of the boiler individually, and finally the whole boiler, is carefully tested to 85 pounds hydrostatic pressure before leaving the factory. Factory certificate of test if desired, is furnished free on request of the steam fitter, architect or owner. Each "RICHMOND" Boiler is set up complete at the factory; every piece, no matter how small or large, is fitted in place, insuring ease in setting up and proper fitting together of the several parts.

SIZES. "RICHMOND" Round Boilers range in capacities from 250 to 1300 square feet direct radiating surface for steam and from 400 to 2150 square feet for hot water, a range of sizes meeting the requirements of the home or larger structure. Sizes and capacities are given in detail on pages 76 and 77. The capacities there given are based on the proviso that all piping mains, risers, flows and returns shall be covered or figured as radiating surface, and included in the total.

We would impress most forcibly upon the mind of the buyer the fact that it is wise to use a boiler with ample reserve capacity above the usual requirements. Sudden and severe changes in weather should be foreseen and preparations made to meet them. Doors and windows may by constant use become loose fitting and admit cold air; an additional room may be heated or the house enlarged — all these conditions can be met with a "RICHMOND" Boiler without forcing the fire, even during coldest winter weather and without extraordinary consumption of fuel.

"RICHMOND"



"Richmond" Steam Boiler
Sectional

"RICHMOND"

"RICHMOND" SECTIONAL BOILERS

For Steam and Hot-Water Heating

DESCRIPTION

THE SEVERAL SECTIONS. The boiler consists of several sections placed vertically in a row from front to back.

The several sections are connected and held together by headers or drums, one on top and one on each side at bottom. The headers are fully hereinafter described.

Each section is provided with large fire surfaces. The direct rays of the fire penetrate the overhanging surfaces, and coming in contact with the sides, front and back surfaces of the fire chamber, every portion of which is backed by water, the heat is rapidly and greedily absorbed.

The cross waterway above the crown sheet provides a positive and better circulation than in any other boiler, and insures this surface being impinged by the heated gases in combustion.

The "RICHMOND" Boilers have no flat surface between the sections so common in other boilers. The possibility of rust forming at these points and interfering with the efficiency of the boiler is thus positively prevented.

The arrangement of the flues provides a large combustion chamber. The entire fire chamber and the center space above, right to the very top of the boiler, constitute a combustion space with a larger amount of fire surface than can be found in any other boiler.

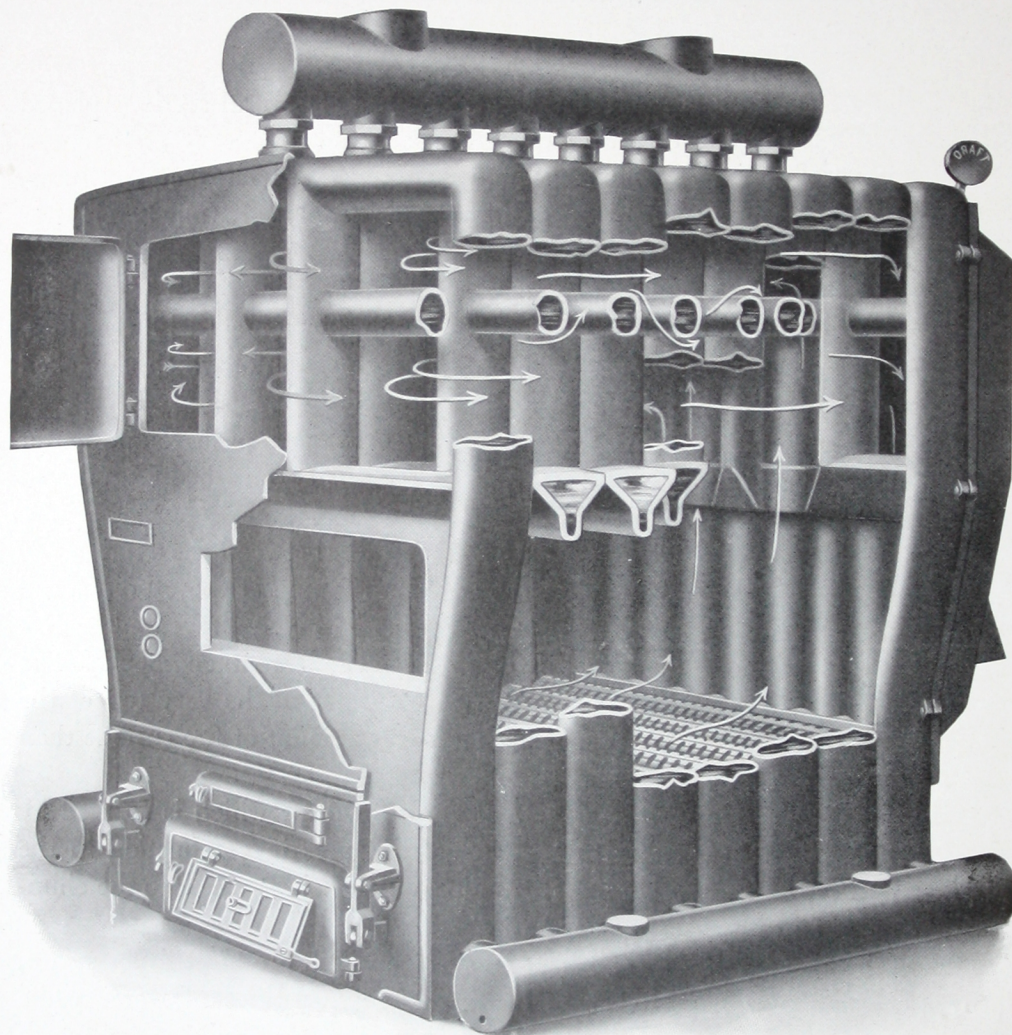
The boiler has a long fire travel. The down draft which is formed by the smoke box, hereinafter described, holds the gases in combustion in the boiler longer than in any other system and prevents their escape into the chimney until fully consumed.

The steam boiler has a superheating surface which produces dryer steam, prevents lifting water, and insures heating large quantities of water while maintaining it in continuous and positive circulation, absorbing heat to such an extent that the products of combustion reach the chimney at a very low temperature.

The "RICHMOND" Boiler has more surface below the water line than can be found in any other similar size of boiler.

The advantages of the water base, formed by legs of sections extending to the floor, are many. The water base forms a stronger and heavier base,

"RICHMOND"



"Richmond" Sectional Boiler

Showing arrangement of large combustion chamber, fire surface, and long fire travel from fire chamber to smoke outlet

"RICHMOND"

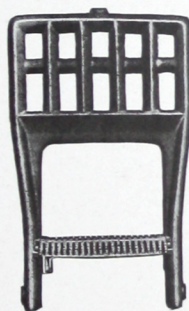
far better than the ashpit bases formed by thin shells of iron. The water base being surrounded by water prevents burning out of the grate bars, and escape of heat into basement. It can be covered with asbestos cement. The surface in the base positively adds to the heating capacity of the boiler. It prevents deadening the edges of the fire and insures perfect combustion at the sides and ends, as well as in the center of the grate, thereby increasing its capacity materially. In boilers provided with shell bases the cooler water from the returns is delivered to one or two sections on a line level with the grates, which deadens the edges, leaving an uneven fire, bright in center and deadened at sides. In the "RICHMOND" the water from the returns is brought to sections below the grates, insuring perfect combustion.

To demonstrate that there is heat below the grates, painted and varnished surfaces of shell bases, as used in other constructions, become burned and scorched after one day's use. The heat below the grate in the "RICHMOND" is fully absorbed by the water in the leg or base.

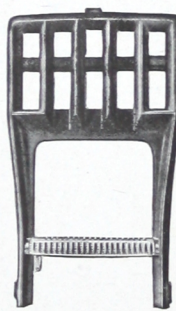
The water base is also of distinct advantage in steam boilers, since the extra depth of the water leg adds 12 to 14 inches to height of the column of water in boiler, which extra height insures steady water line, free from surging and foaming



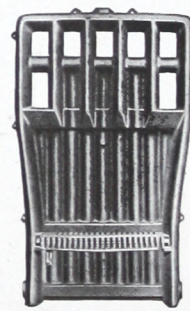
Front Section



Intermediate Section



Cut Leg Section



Back Section

SECTIONS ARE INTERCHANGEABLE. The different sections are made from templates and admit of any interchanging desired. Should an owner at some future date enlarge his home and require additional boiler capacity, it is possible to add additional sections at nominal expense, thus saving the cost of a new boiler. The extra sections, although ordered separately, and perhaps after the lapse of years, will, because made from the same templates, fit perfectly in place.

"RICHMOND"



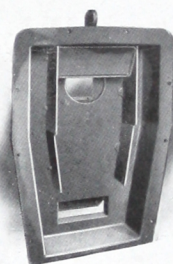
"Richmond" Water Boiler
Sectional

"RICHMOND"

WATER CIRCULATION. The circulation of water in this boiler is unimpeded and as rapid as fire can make it. The large waterways provide perfect and continuous circulation, a high temperature of water in the water boiler and a guarantee of dry steam and steady water line in the steam boiler.

The construction of the water leg or water base section is in keeping with the construction of all railroad locomotive and marine boilers which have water extending down to the bottom of the ashpit. This construction, according to eminent engineers, gives the greatest possible measure of efficiency and economy in consumption of fuel.

SMOKE BOX AND DIVIDING FLUE. The illustration on this page shows the smoke box and dividing flue. It is made of cast iron and is attached to outside of rear section. Under direct draft, which is seldom used, the products of combustion pass through three center openings or flues in rear section directly to chimney. When the small damper shown in center at top of smoke box is left in vertical position, it rests against and closes the direct draft to chimney. When closed the products of combustion, as hereinafter explained, travel through the boiler, and back to smoke box through the outer row of flues; here they enter the right and left divisions or chambers of the smoke box, and cannot enter chimney until they have passed downward under division plates, then up to smoke outlet and to chimney.



Smoke Hood or Box

It is this down draft in dividing flue that retains the heat in combustion long enough to ignite the gases, instead of emitting them, wasted, into chimney. The smoke box, since it covers the rear section and compels the products of combustion to come in contact with the outside surface of the section, adds to the heating surface of the boiler, increases its efficiency and enhances its value as a fuel saver.

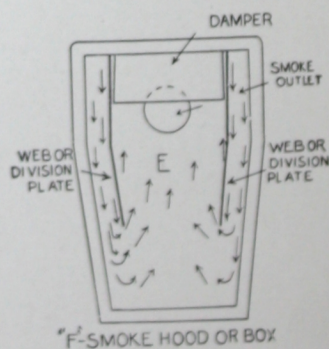
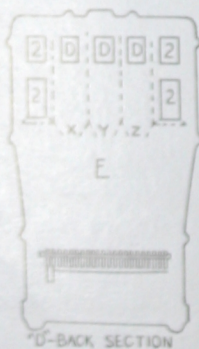
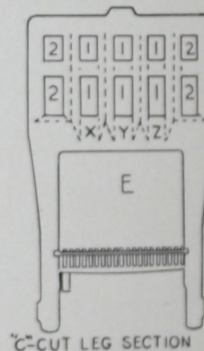
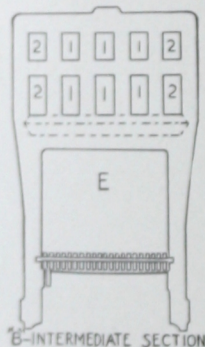
FIRE AND FLUE TRAVEL. All boilers should be provided with a method for creating direct, also indirect draft. By "Direct" draft is meant a short travel from fire chamber to chimney flue. By "Indirect" is meant a longer travel, one requiring smoke and gases to pass forward and back through boiler.

"RICHMOND" Boilers are provided with the most perfect arrangement of direct and indirect drafts.

"RICHMOND"

In the "RICHMOND" on starting fire, or when increasing combustion, the direct draft damper can be opened and the strong, direct draft will quickly bring the heat to the desired temperature. At all other times, the direct draft damper is closed and the products of combustion are required to pass through the boiler and come in contact with every portion of the heat absorbing surfaces. The flame and gases from the fire come in contact with the surfaces of the fire chamber, front, back, sides and top, pass to rear of fire chamber, then up and forward through the center rows of flues above fire chamber, then back through the outer rows of flues, one on each side.

In order to more minutely describe the fire and flue travel in the "RICHMOND" Boiler, special illustrations with letters and figures are here shown. "A" is the first or front section of boiler; "B" is the intermediate or middle section. Each boiler is provided with a number of these intermediate sections, the number depending on the capacity; "C" is a cut leg section, and is placed in front of the rear section; "D" is the back or rear section. The fire and combustion chamber, directly over the grates of each section, is marked "E."



"RICHMOND"

The gases from fire chamber pass up through the three passages, marked "XYZ," shown on illustrations "C" and "D." These passages are provided only between rear and next to rear sections. When direct draft is desired, the damper is opened and the gases pass direct to chimney through the three flues D. D. (direct draft); these three flues D. D. are the only ones controlled by the direct damper.

When the direct damper is closed, the flues D. D. are shut off, and the passage of gases after rising through "XYZ," as above described, is forward through the inner flues marked No. 1, and backward through the outer flues marked No. 2. The flues No. 2 are not controlled by back damper and are, therefore, always open to allow the passage of the gases through them to the chimney.

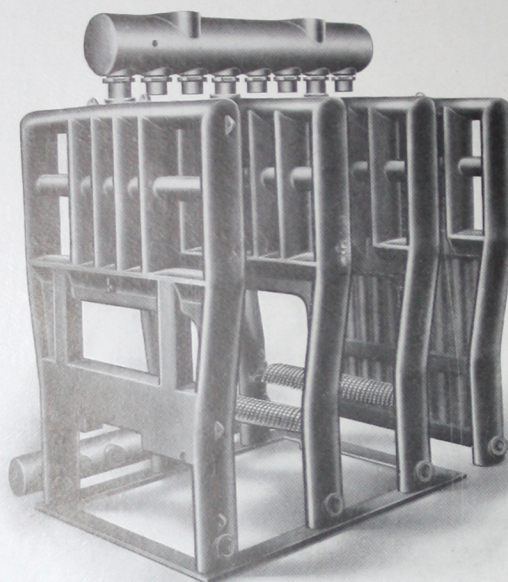
The smoke box or dividing flue is provided with two web castings, which carry the gases downward directly from flues No. 1, and after passing under the webs, rise and enter smoke pipe and pass on to chimney.

THE HEADERS. Another of the important features of the "RICHMOND" Sectional Boilers is the "Header Construction." These headers or drums are placed at the top and sides of the boiler; they are expensive to manufacture, adding as they do to the weight and cost of labor, but the advantages derived by their use are so many and so pronounced that the question of expense was not considered in the decision to construct the "RICHMOND" Boilers with headers. Boilers, the sections of which are connected with slip or push nipples and without outside headers, are not only a "cheaper" type, but incomplete, as it were, and not to be compared with the superior construction of the "RICHMOND".

For steam heating the top header provides: Quicker and dryer steam than is possible with other constructions, the free and easy separation of the particles of steam from the water and their quick delivery to the piping, preventing water from being lifted into mains and radiators. For hot water heating, this top header secures the quick delivery of heated water from each section to the mains, insuring positive and continuous circulation. Since each section is provided with top outlet, which is not the case in slip or push nipple construction, in which only one or two sections of the whole are so provided, the circulation of steam and water is without gurgling, noise, or sound of any kind. This absence of all sound proves that the circulation is perfect.

In steam heating the side headers provide: The equal delivery of water of condensation to every section of the boiler. In hot water heating the side

"RICHMOND"



"Richmond" Sectional Boiler

Showing the sections and headers. Each section is independent of the others. All joints are outside and away from the action of the fire

headers guarantee the equal delivery of return water to every section. The water returning to the boiler is cooler than the water in the boiler, and to avoid bringing back all the cooler water to one or two sections, these headers receive and equally distribute the water to each section. This insures equal expansion and contraction in every section of the boiler. In boilers without headers, the return water is brought directly to one or two sections, thus overtaxing them to the detriment of the boiler. Such sections with their greater volume of colder water, as compared with the other sections containing only heated water, explain the uneven expansion and contraction in boilers without headers.

By the use of the headers all joints are outside and away from the action of the fire and heated gases. The joints are within convenient reach and all can be plainly seen from the exterior.

Each section of this header constructed boiler is a boiler in itself. Each section is independent of the other. Should a section become damaged or broken it can be disconnected from the headers, the openings plugged, the old section left in place, for an indefinite period until repair arrives, without

"RICHMOND"

interfering with the operation of the boiler. This is something impossible in the push or slip nipple constructed boiler. While damage is a remote possibility, and can only be occasioned through gross neglect or positive abuse, it must be considered. In the event of a cracked or broken section in a slip or push nipple boiler, the entire apparatus is out of commission, necessitating temporary installation of stoves, living in cold rooms or vacating premises.

To the many advantages of the header construction, we credit much of the success and popularity of the "RICHMOND" Boiler.

ASHPIT. The ashpit is formed by the legs of every section extending to the floor, thereby completely surrounding the ashpit by water, preventing the escape of any heat into the basement and materially increasing the efficiency of the boiler. The rear or back section extends to floor, full width of the boiler, and thus forms the rear of ashpit. The front of ashpit is formed by ashpit plate, in which is placed the ash door, also clinker door as shown in illustration page 30. The connecting rods operating the grate extend through this plate, as shown in same illustration.

The ashpit is of sufficient depth to prevent burning out the grates with an ordinary accumulation of ashes, which in mild weather do not require removal but once in 24 hours. The cleaning door, which is of the swinging pattern, is large and permits of easy access to ashpit.

The ashpit door is provided with lifting and sliding draft dampers. The lifting door on steam boilers is operated by an automatic draft damper regulator, which automatically closes it when the steam pressure is raised and in the absence of pressure leaves lift in a raised position to admit air, until the increased pressure again causes the regulator to close it.

Hot water boilers are not provided with automatic damper regulators, as a hot water system is without pressure. On hot water systems a connecting chain to lifting door with extensions to first or second floor rooms, directly above the boiler is convenient. In such rooms three hooks, one above the other and about an inch or two apart, with ring inserted, permit the raising or lowering of the lift door, so that the fire can be checked or revived without necessity of going to the basement. The fire can thus be checked in the evening and opened in the morning, and in a short time any room will be comfortably heated. An automatic regulator is not essential to the operation of the hot water heating apparatus, but where desired a "RICHMOND" regulator can be supplied at a small extra charge. This regulator opens and closes draft doors and dampers without attention.

"RICHMOND"

THE GRATES. The grate bars are oval in form; they cut the bottom off the fire better than the round or flat grate used in other boilers. The grate bar has two back bones running through it, and while as light as other bars, is stronger than any other and cannot warp or twist by being left in a wrong position. This is possible with other grates that have but one center bar or back bone.

These grates are made of cast iron, heavy and strong enough to support the deepest fire. Each grate consists of short projections or teeth, with openings between permitting the draft to pass through the teeth and between the several bars on its way to the fire. This free circulation of the air prevents the grates from warping. When the grate is shaken or agitated the ashes drop through; clinkers are gripped and broken by the teeth or projections of one bar against the other. With a slight movement of the shaking lever, forward and backward, the fire is cleared of ashes and combustion increased. By bringing the lever entirely forward and backward the fire can be dumped into ashpit. When the lever is left in vertical position the grates are in proper horizontal position. The grates are carefully made and placed in ashpit at factory and are easily operated by any person. The grate bars are interchangeable and are operated by lever or levers from front. Except in the 20 Series, which has a single lever, the grates are operated by a double lever. The grates extend from side to side, not front to back, and any bar can be removed and replaced without disturbing the others. The grates have a lug or projection on each end which fits into the sections of boiler; an extension piece connects the several bars to connecting rod, which is operated by a lever in front. Boilers provided with two levers have front bars operated by one lever, and rear bars by the other.

The grates, as stated, are heavy and strong. They should last as long as the boiler, and the boiler should outlast the building; yet, if through abuse or neglect, any bar should be damaged the services of an expert are not necessary. The boiler, or any part of it, need not be taken down or disturbed; simply by loosening grate from connecting rod the old bar can be taken out and the new one inserted through fire or ashpit door. Any one can change a bar in a few moments' time.

CLINKER DOOR. At the bottom and in front of firepot, in a line with grate, is provided a clinker door permitting the removal of clinkers or



Grate used in Sectional Boilers

"RICHMOND"

slicing of the fire with a slice bar, instead of shaking the grate, when found desirable.

NIPPLES. Connections between the sections and headers are made by extra heavy threaded nipples. There is not a push or slip nipple, asbestos, rubber or gasket, in the entire boiler. Not a single joint or connection is exposed to the action of the fire or heated gases. There are no bolts to hold the sections so rigidly together as to interfere with the natural expansion and contraction. The threaded nipple connection as used in the "RICHMOND" Boilers is the same as that used for high pressure power work in factories, mills, steamships and government work, where only the best is allowed. This connection is far superior to the slip nipple type used in some boilers, which type depends upon long rods, bolts and nuts for holding sections together. The rods and bolts being made of wrought iron and the boiler of cast iron, the expansion and contraction of the two metals differs and precludes a tight or lasting joint. The paper, rubber or asbestos gaskets used in some boilers are continued sources of trouble, worry and expense; made of materials which have no lasting qualities. They cause leaks at the joints and often need re-packing during coldest winter weather, just when heat is most needed. By specifying the "RICHMOND" which is the embodiment of the very best, all trouble, worry and expense is avoided.

FIRE DOOR. The fire door is placed at proper height in firepot to permit maintaining deep bed of fire. The door is provided with slide for admission of air to fire-chamber to ignite the gases. It is lined on inside with a heavy cast iron perforated plate, providing an air space to protect the door from warping.

CLEANOUT DOORS. These are placed in front of the boiler between each section and through them every part of the surface is accessible for cleaning or inspection.

COIL FOR DOMESTIC WATER HEAT. "RICHMOND" Boilers are provided with an opening for the admission of a coil into the firepot for heating water for domestic purposes. The openings are placed in the fire door frame on left hand side, as shown in illustration on page 32. Small plate on inside is held in place by a screw and bolt covering the opening. If coil is not desired the plate is left in place. If desired the plate can be unscrewed and the firepot is ready for admission of the coil.

FUSIBLE PLUGS. All "RICHMOND" steam boilers are fitted with fusible plugs. If water gets below a certain level the fuse in plug melts and the

"RICHMOND"

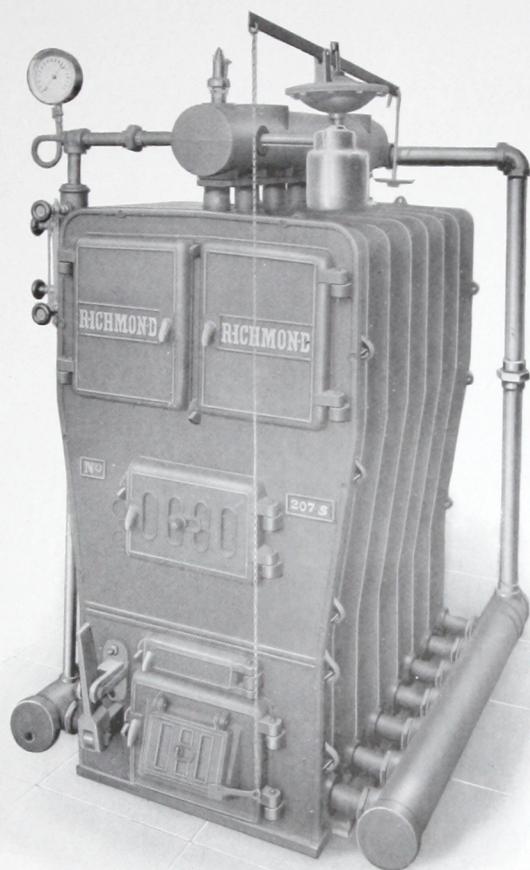
escaping steam extinguishes the fire; the hissing noise of the escaping steam serves to notify user that water is low and supply should be replenished.

FIRE TOOLS. "RICHMOND" Boilers are provided with a hoe and poker for firing and with flue brush for cleaning surfaces.

TRIMMINGS. Hot-water boilers are not provided with any trimmings. They are not essential to the successful operation of the apparatus. However, "RICHMOND" Water Boilers are provided with proper openings for attachments, if desired, of a thermometer and an altitude gauge which are furnished at a very nominal cost. The use of a thermometer and altitude gauge is recommended. The thermometer registers the temperature of the water, as it leaves the boiler, being a guide for either increasing or checking the combustion. The altitude gauge registers the level of the water in the system, and lowering of the water due to evaporation or other cause is shown on the gauge, obviating the necessity of trips to the upper floors to inspect the expansion tank and to the basement to supply additional water. By the use of the gauge, the height of the water can be determined daily while attending the fire, and if water is needed it is supplied through a valve near the boiler. The loss of water through evaporation is very little, amounting to only a few gallons during an entire heating season.

Steam boilers are provided with the following trimmings: Steam Gauge, to register the number of pounds of steam pressure carried on the boiler, which averages about 2 pounds on a low pressure steam heating system. A Safety Valve made of brass and set to open at 10 to 15 pounds. This valve is seldom brought into use, as the steam pressure rarely gets high enough to cause it to open. A Water Gauge, consisting of water column, compression gauges, water gauge glass and guards. The water gauge registers the height of the water in the boiler. An Automatic Draft Damper Regulator, consisting of regulator, lever, weight and chain which controls the pressure of steam and the combustion of the fire, and automatically opens the draft door in the ash-pit and at the same time opens the check damper in smoke hood, or vice versa. By placing the weight at different points on the lever, any desired pressure can be maintained; during the day a slight pressure, if desired, and during the night partially or wholly checked. With the steam gauge is furnished syphon and cock with water column and regulators, all pipe cut to exact length and fittings necessary to properly connect same. Draw-off Cock for the purpose of drawing water from the system is also furnished; by opening Draw-off Cock, apparatus can be entirely emptied in a few minutes time.

"RICHMOND"



"Richmond" Sectional Steam Boiler
Showing trimmings and equalizing pipe

EQUALIZING PIPE. For steam boilers we recommend the use of an equalizing pipe. Some manufacturers furnish openings for the connections of the equalizing pipe, requiring the fitter to provide the material. Other manufacturers do not even provide the openings. Recognizing the importance of this arrangement, we not only provide boilers with openings, but also furnish the pipe properly cut, and with fittings to make this connection. The purpose of the equalizing pipe is to maintain a steady water line. As the water reaches the boiling point and the steam particles separate themselves from the water, the water is more or less agitated often lifting and dropping to such an extent that it is impossible to determine whether the boiler is sup-

"RICHMOND"

plied with little or much water. It is essential that the water be maintained at the proper level at all times. This is possible only with the large and specially made equalizing pipe furnished gratis with all "RICHMOND" Boilers.

FUEL. The construction of the "RICHMOND" Boiler with its deep firepot, arrangement of sections, special grate, accessibility for cleaning, permits burning hard or soft coal, pea coal, screenings, coke or wood.

TEST. Each section of the boiler individually and finally the whole boiler is carefully tested to 85 pounds hydrostatic pressure before leaving the factory. Factory certificate of test if desired, is furnished free, on request of the steam-fitter, architect or owner. Each "RICHMOND" Boiler is set up complete, at the factory; every piece, no matter how small or large, is fitted in place, insuring ease in setting and proper fitting together of the several parts.

SIZES. "RICHMOND" sectional boilers range in capacities from 525 to 9,450 square feet, direct radiating surface for steam and from 850 to 15,700 square feet for hot water, a range of sizes meeting the requirements of the home or larger structure. Sizes and capacities are given in detail on pages 72, 73, 74 and 75. The capacities there given are based on the proviso that all piping mains, risers, flows and returns, shall be covered or figured as radiating surface and included in the total.

We would impress most forcibly upon the mind of the buyer the fact that it is wise to use a boiler with ample reserve capacity above the usual requirements. Sudden and severe changes in weather should be foreseen and preparations made to meet them. Doors and windows may by constant use become loose fitting and admit cold air; an additional room may be heated or the house enlarged — all these conditions can be met with a "RICHMOND" Boiler without forcing the fire, even during coldest winter weather and without extraordinary consumption of fuel.



GREENHOUSE HEATING

In no other branch of heating science has there been such marked advance as in that devoted to greenhouses. Antiquated methods have given way to improved processes and to-day greenhouses, large or small, can be heated as easily by a steam or hot water system as any other structure. Steam heat is generally used in the larger ranges of greenhouses; while hot water is preferred for smaller stretches of glass.

The central heating plant with one boiler supplying the entire structure is no longer advocated by experts. Instead the installation of two or even three boilers is recommended, so that in case of accident to one, the other or others can be used to save the vegetation or flowers from loss. Again, it will be more economical to maintain a fire in one of the small boilers during mild weather than to operate a large boiler. During mild weather one boiler would be sufficient to operate the required radiation. The radiation and piping can be arranged in units, distributed throughout the greenhouse so that the temperature of one or more sections can be raised or lowered without affecting the entire system. Different vegetation requires different temperatures, and it is possible to maintain different degrees in various parts of the greenhouse.

"RICHMOND" Sectional Boilers are commonly used in greenhouse work, their construction being such as to insure a maximum amount of heat in the shortest period, thus providing a quick means of overcoming any sudden drop in outside temperature. With judicious selection as to size, "RICHMOND" Boilers need not be forced, thus insuring length of life and fuel economy.

"RICHMOND"

The need of ventilation in large buildings or where groups of people congregate, as in churches, schools and theaters, is an insistent one, and now so recognized by sanitarians the world over. It is a question of public health.

But ventilation must be secured in combination with the heating system and not through open windows or doors left ajar. There must be a continuous inflow of fresh, warm air — not cold drafts.

The old-fashioned furnace attempted to solve this problem, but signally failed. The fresh air with its vital oxygen passed over the superheated furnace drum and was consumed, poisonous carbonic gas taking its place.

"The "RICHMOND" System by means of its indirect or direct-indirect radiation provides a method of actual ventilation — fresh air coming into the various rooms at exactly the right temperature carrying with it no furnace gases or dust; and displacing the foul air thrown off by human lungs.

The value of fresh air is comprehensively stated in the following paragraph from "The London Hospital."

"The admitted advantage of an out-door life in many morbid conditions, especially in bronchial troubles, seems to point to the conclusion that there is something definitely injurious in the outdoor life which is now the common mode of existence among civilized people. It is a striking and startling thing that the mere removal of a patient into the open air should lower his fever, should remove his night sweats, and take away his hectic, and it is difficult to avoid the conclusion that if these symptoms are removed by the purity of the air outside they must have been largely caused by the impurity of the air *within* the house. Doubtless the healthy struggle against and overcome evil influences before which those who are tuberculous succumb, but that is not to say that in the struggle we do not suffer; and, indeed, the facts recently brought forward are sufficient to show that the stuffy life of warmth and comfort which civilized man now 'enjoys' is bad for the health even of the healthiest. We make our windows fit, we pad our doors, we shiver at a draft, we surround ourselves with woollen curtains, dusty, carpets and fluffy, luxurious upholstery; we breathe stuffy, dry, impure air, and then we wonder that we are not strong and vigorous. How powerful for evil these conditions are, is shown by the fact that their mere removal gives back that vitality which enables us to overcome the seeds of disease. Fresh air is not a thing to be taken in little doses once a day, *but a thing to live on.*"

"RICHMOND"



"Richmond" Direct Radiator

THE RADIATOR

Radiators are the direct medium or agency for the distribution of heat in the rooms. Within their hollow walls circulate the steam or hot water, their surfaces giving off the heat to the surrounding air. As the air cools it descends in invisible and imperceptible currents to the floor and to the base of the radiators, where it again passes over the radiator surface and is again heated.

Radiators are ordinarily the only part of the heating apparatus exposed. Made in many forms, shapes, sizes and heights, they can be placed almost anywhere in the rooms.

They should be placed where they can most quickly counteract the outer chill — best locations are along exposed walls, under or near as possible to windows. To insure uniform warmth, the radiation in large rooms should be divided, and radiators placed at two or more points. Radiators should not be placed too close to walls to prevent free circulation of the air over the heated surfaces, nor should the free flow of the heated air upward be obstructed by shelf or other projection. Shelves or window seats placed over radiators should allow for from two or four inches space above radiator.

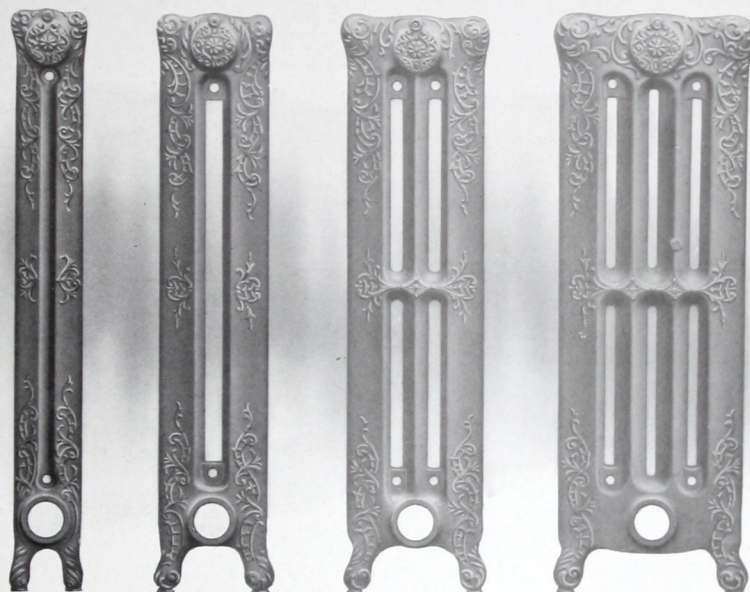
The radiators are free from dust and dirt lodging surfaces. Science has only recently brought to light the menace of circulating dust in its relation to health. A knowledge of germ-life reveals its close alliance with dust, and since radiator surfaces are free from dust, and because the circulation of air in rooms heated by radiators is so gradual, dust is suppressed, germs are destroyed, and health in home and places of public assembly enhanced.

"RICHMOND" Radiators are made for direct, direct-indirect and indirect, in plain or ornamental patterns, graceful and symmetrical in form, and can be decorated in bronze, or enamel to harmonize with the decoration of the rooms in which they are placed. Radiators are made in any desired length to suit space allotted to radiator and required for room, without interfering with space allotted to furniture.

The radiators are made in sections, which are interchangeable. Sections can be added or removed from radiators, even after the lapse of many years. Should the size of a room or rooms be increased or decreased, the size of the radiator can easily be changed to conform to the altered size of rooms.

Radiators are so connected that any number can be shut off without interfering with the circulation of the others.

"RICHMOND"



TYPES OF RADIATORS

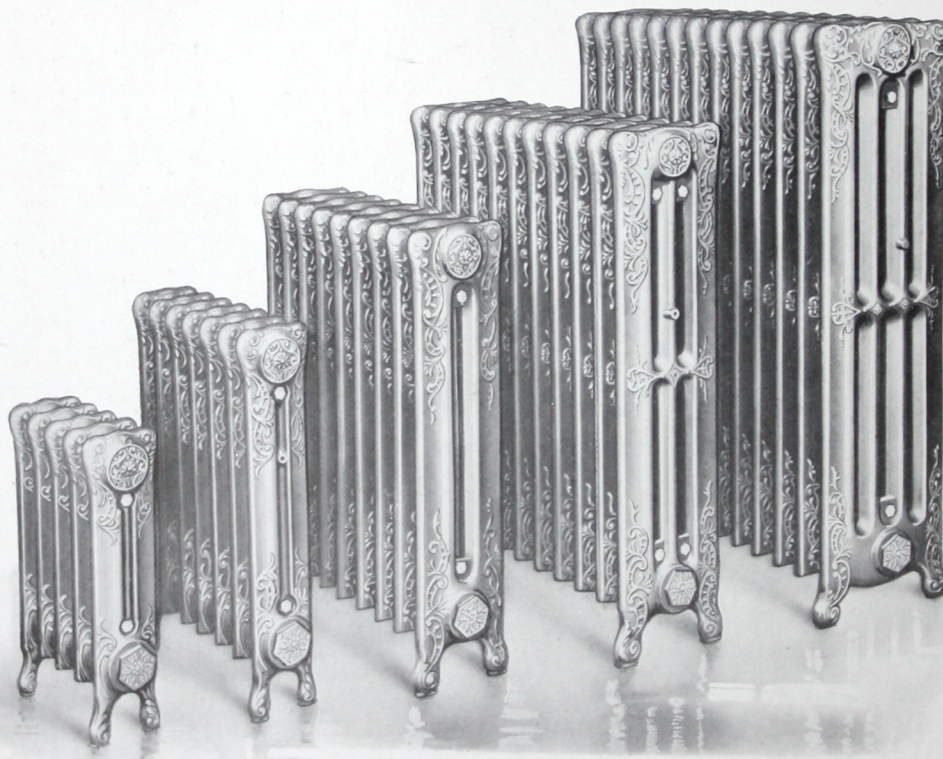
There are three distinct types of radiators — direct, direct-indirect, and indirect.

THE DIRECT RADIATOR as shown on page 45 is the type most generally used. It is independent of any attachment or device for supplying or heating fresh outside air. It is used where proper change of air is provided, through frequently opened doors, through windows left open for intervals, or through fire-place, skylight or the like.

Direct radiators are usually designated by the number of columns. We here show four full front views of the one, two, three and four column patterns, that on the left being the one or single column, and the two, three and four column next in order. The single column pattern is very narrow and more generally used in hallways, bath-rooms, etc., or where space is limited. Where space is not limited the two and three column are used, and where space is limited as to length, the four column. The one column radiator is $3\frac{1}{2}$ inches wide; the two column $8\frac{3}{16}$ inches; the three column $9\frac{7}{8}$ inches and the four column 13 inches wide.

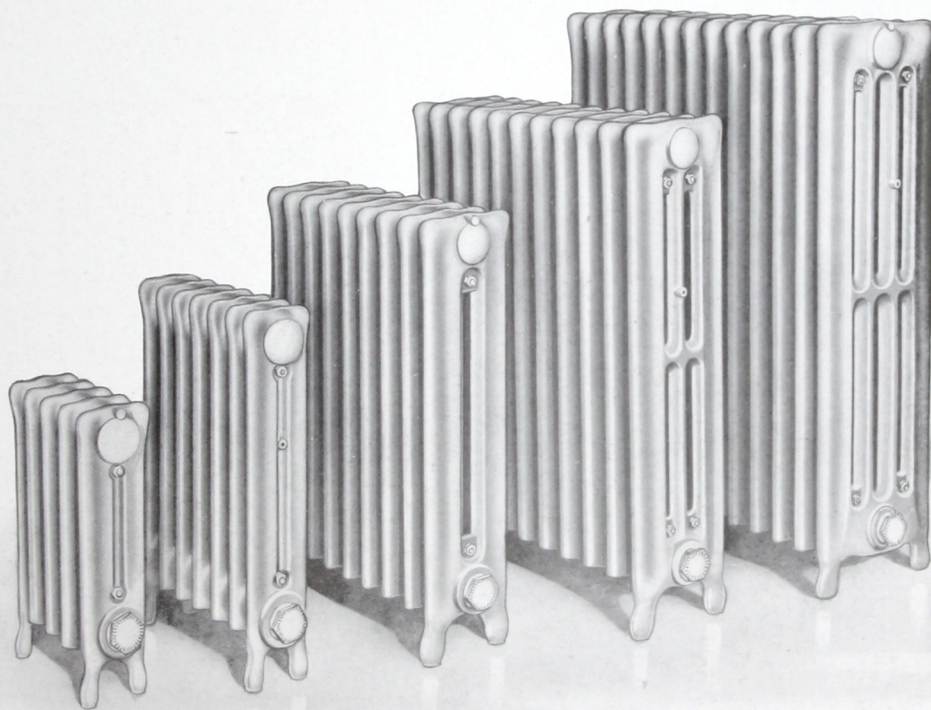
"RICHMOND"

The "RICHMOND" direct radiator is made in many heights and widths and of any desired length. The illustrations herewith show the one, two, three and four column patterns, which are regularly made in 18, 20, 23, 26, 32, 38 and 45-inch heights. Special heights can be furnished from 19 to 50 inches. The radiators illustrated on this page are known as "ornamental" and those on the opposite page as "plain."

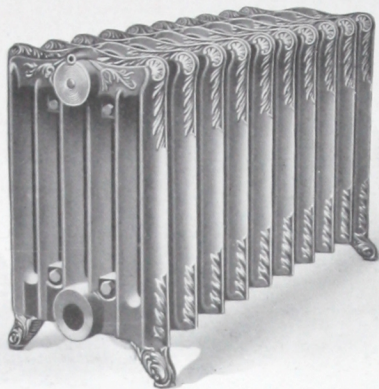


"RICHMOND"

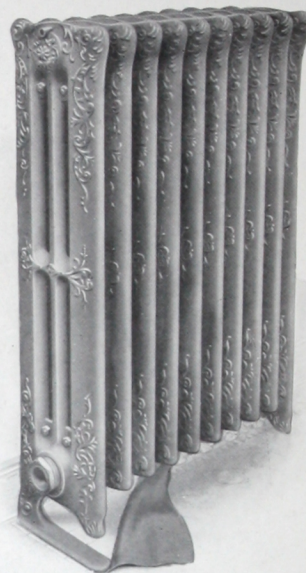
The choice between ornamental and plain radiators illustrated on these pages is a matter of preference. The ornamental was for many years the only pattern manufactured, and for that reason buildings are more universally equipped with that style of radiators. A growing demand has been created for the plain pattern, especially so for buildings like hospitals and sanitariums where the most sanitary conditions must prevail. While neither pattern has dust-collecting surfaces, the plain pattern with its perfectly smooth exterior is always free from the least particle of dust.



"RICHMOND"



A special pattern of direct radiator is the window or six column pattern above shown. It is made 12 inches wide and 13, 14, 16, 18, and 20 inches high. This radiator is made plain and ornamental. Window radiators are for location under windows, along windows, and bulk-heads in stores, in recesses like bay windows, in nooks, under sink drain-boards, in kitchens, etc.



The other illustrations are those of special patterns to save cutting carpets or displacing the radiator to take up the carpet. The illustration on the right is that of a radiator with carpet-feet attachment and that at the bottom of a radiator with "foot-ups."

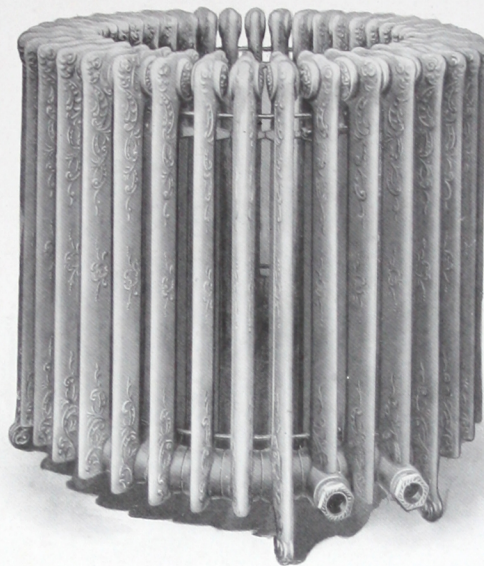
These special patterns are made in all heights, widths, plain and ornamental.

While the direct radiators illustrated and described thus far can be placed where most effective, and where not interfering with furniture, tapestry and the like, it is often con-

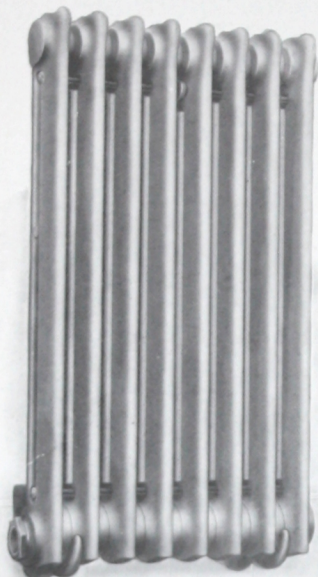
"RICHMOND"

venient to have special patterns to fit into corners, angles and circular places like bay windows, or encircling columns or pillars in stores and halls.

"RICHMOND" direct radiators of the various heights and columns can be furnished for all such special locations to fit any space or condition, without encroaching upon the space required for furniture and still have sufficient capacity for heating the room in which they are placed. The upper illustration is that of the "RICHMOND" column, and the lower that of the "RICHMOND" stairway radiator.



"RICHMOND"



Direct Wall Radiator on Brackets

On the preceding pages we have illustrated and described radiators with legs set on floor.

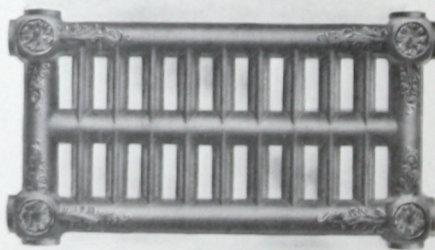


On this page we illustrate radiators suspended from walls by means of hangers. Wall radiators are desirable where floor space is limited, or where for other reasons found necessary to keep them above floor level. Illustration on



left hand is that of a one column radiator; this wall radiator can also be furnished in two, three, and four column patterns.

The "RICHMOND" Wall or Ceiling radiators, a section of which is here shown, is a special pattern of direct radiator. It is very narrow and like the one column can be placed in corridors, bath-rooms, steamer state-rooms and the like, or where space is limited. As its name indicates, this radiator can be hung from the wall or suspended from the ceiling. The illustration on the right is merely one section of a radiator. On opposite page are shown a few of the many ways these sections can be connected or grouped, making it possible to place this radiator in locations and situations where the ordinary direct radiator can not be used.



Single Section Wall Radiator

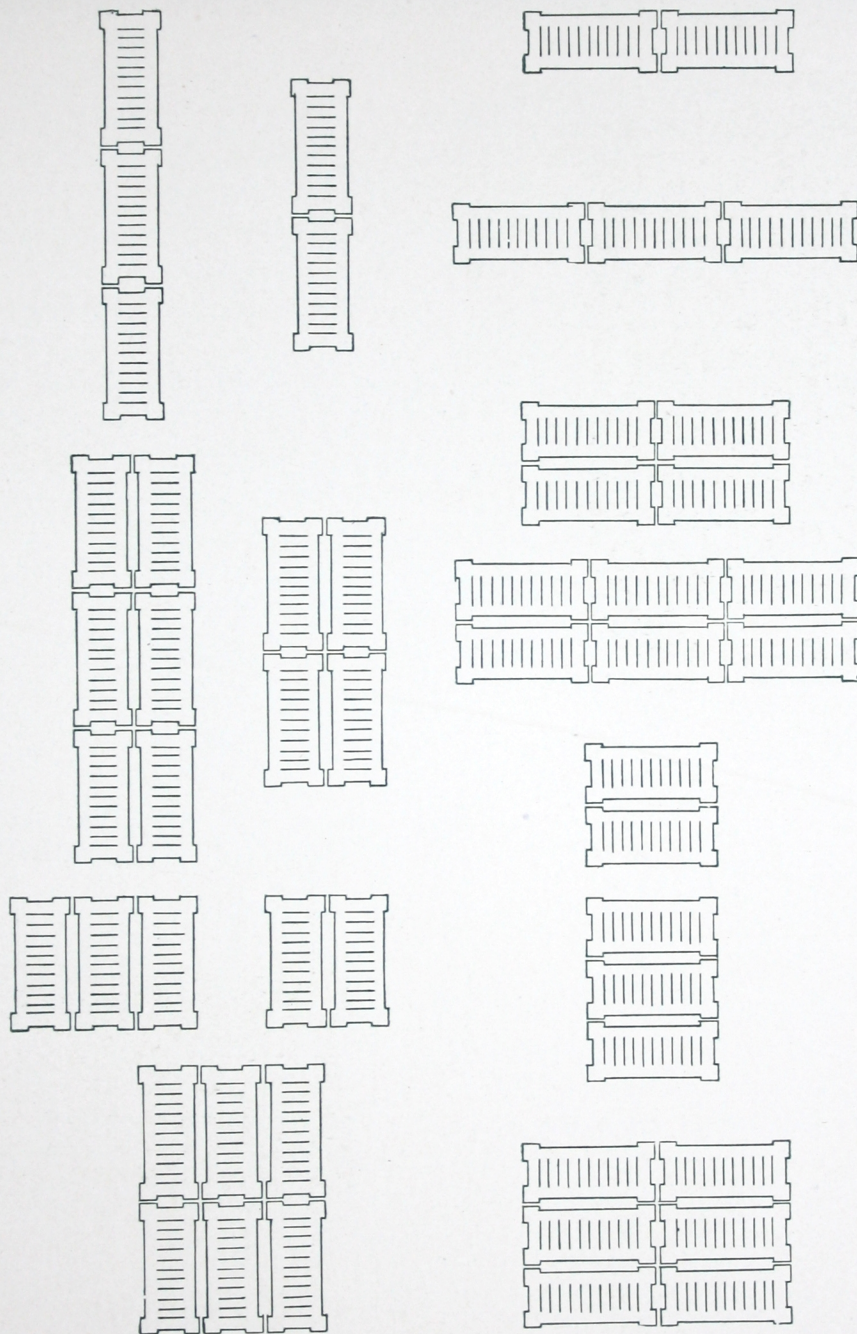


Bracket



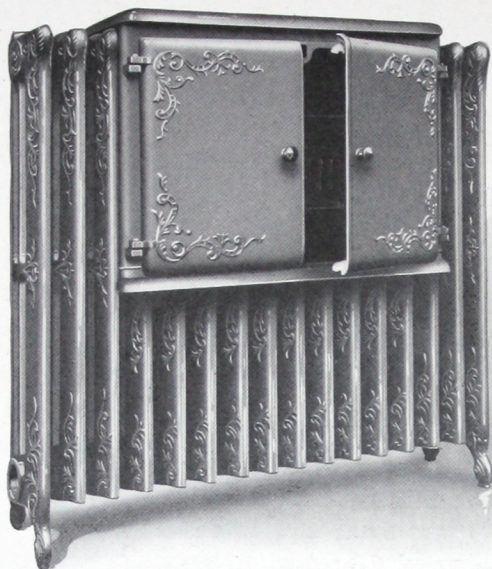
Bracket

"RICHMOND"



Showing groups of Wall Radiators

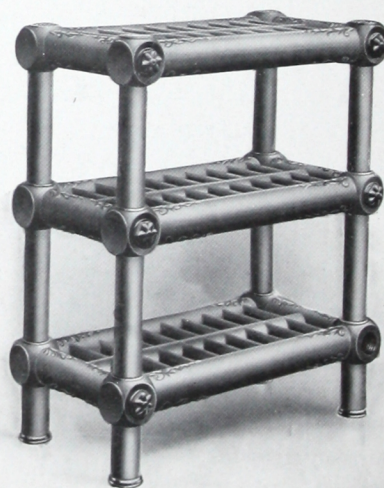
"RICHMOND"



"Richmond" Dining-room Radiator

The accompanying illustration is that of a radiator equipped with warming oven for use in dining-room. It serves the double purpose of heating the room in which placed, and of keeping victuals and plates warm and ready for service. The oven is provided with shelves and swinging doors.

The Pantry Radiator is especially designed for location in pantry and serves the same purpose as the radiator above described. It is usually enclosed in cupboard under pantry shelf; or may be encased in galvanized jacket provided with doors.



"Richmond" Pantry Radiator

"RICHMOND"



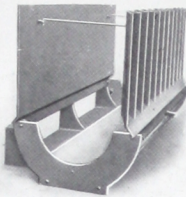
"Richmond" Direct-Indirect Radiator

THE DIRECT-INDIRECT Radiator, like the direct, is placed in the room to be heated. This type is used where ventilation is required, as in places of assembly, schools, hospitals, lodge-rooms, etc.

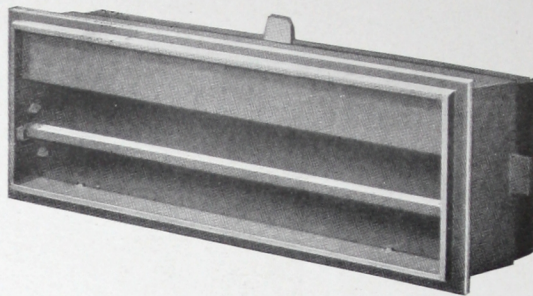
It is recommended that every house be provided with at least one or two direct-indirect radiators. The radiator is placed close to the exposed wall and connected by direct duct to the outside fresh, pure air.

This type of radiator is provided with a cast iron box or base, called box-base.

"RICHMOND"



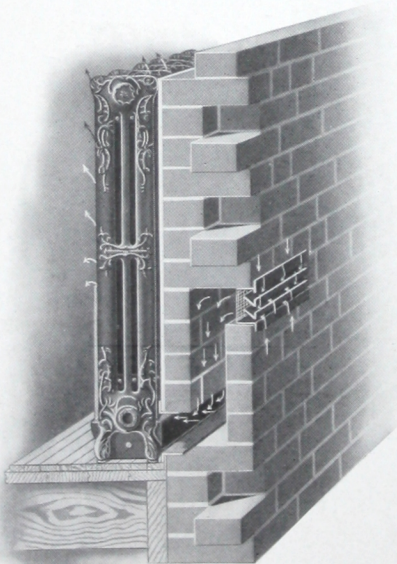
"Richmond" Box Base



"Richmond" Wall Box

The box-base is fitted with dampers to control the supply of fresh air, and also serves as a casing which encloses radiator and requires the air in its ascent to pass over the entire surface of radiator. In outer wall of the room is placed a specially constructed wall-box, which is made of cast iron, the opening of which is covered by fine mesh brass wire to render it storm and insect proof.

With this type of radiator, fresh air is admitted to the room through wall-box and by metal connecting duct through box-base directly to radiator; the air in passing over the radiator will instantly become heated, thus delivering fresh, pure warmed air into the room. The capacity of a direct-indirect radiator should be at least twenty-five per cent greater than that of a direct radiator.

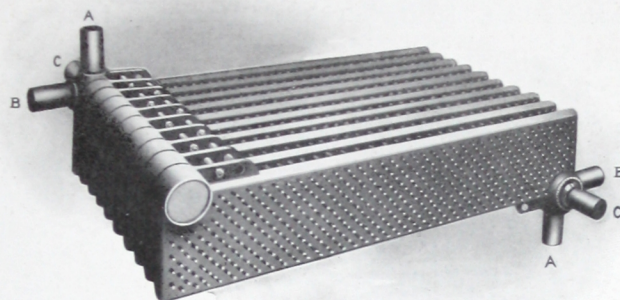


"Richmond" Direct-Indirect Radiator

Showing how room is supplied with fresh, pure heated air

This type of radiator placed in a sleeping room can be used at night as a ventilator. The heat can be shut off, and cold fresh air supplied to the room. The construction of the direct-indirect radiator prevents drafts across the room.

"RICHMOND"



"Richmond" Indirect Radiator

THE INDIRECT RADIATOR is used largely where a complete system of ventilation is desired in connection with the heating apparatus, as in large school buildings, churches, theatres and other places of assembly. This type can also be used in a residence where the space which a radiator would occupy cannot be spared. This type of radiator is usually suspended from the ceiling in the basement, and enclosed in galvanized or wooden boxes, tin lined, or set in brick compartments.

In buildings like churches, schools, and theatres requiring ventilation as well as heat, it is recommended that each room be provided with direct radiators of capacity to heat the rooms independent of the indirect radiation and that the indirect radiation be figured to properly heat and furnish air supply to the rooms for the purpose of ventilation.

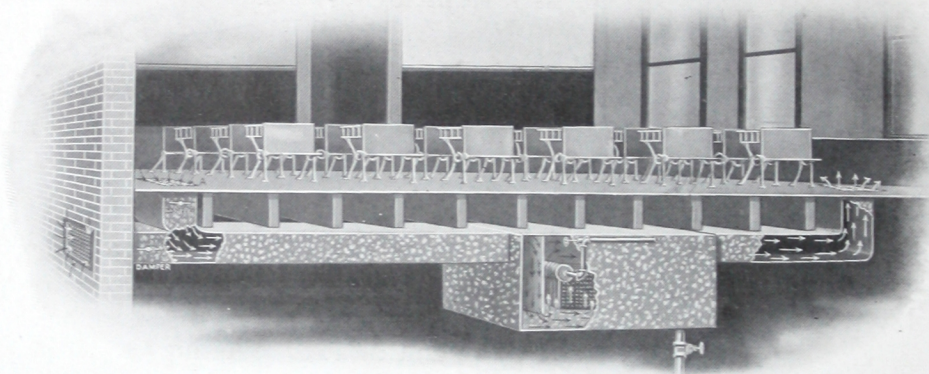
The system of heating and ventilating by means of indirect radiation, as above outlined, like the direct or direct-indirect, is a low pressure safety system and necessitates no licensed engineer nor mechanical device operated under high pressure.

A cold air duct is provided leading from an opening in the outer wall to the bottom or end of the chamber enclosing the indirect radiator; a register is placed over the indirect radiator, or one or more registers can be placed at any distance or on the upper floors and warm air ducts connected from the indirect chamber to such registers wherever placed. The ducts are usually made of galvanized sheet iron.

"RICHMOND"

The supply of warm air is regulated by a controlling valve or damper in the register or duct. The indirect radiator is provided with valves to control the supply of heat passing through it. The illustration below suggests a simple method of securing circulation of air in a room when because of stormy weather it is desired to shut off the outdoor supply. During such period the damper governing the cold air supply is shut off and the register (marked "A" in illustration) opened, providing a rotary circulation of air in the room.

Rooms heated and ventilated with indirect radiators should be provided with ducts or flues to carry off the foul air. Provision can be made for at least three or four changes of air per hour for each room.



"Richmond" Indirect Radiator

Showing fresh air supplied to room after passing over radiator

"RICHMOND"

"RICHMOND" TANK AND LAUNDRY HEATERS

"RICHMOND" water heaters can be used for two purposes; for heating water, for domestic use, for bath-rooms, showers, swimming pools, for stables where water is required for washing vehicles and like purposes, and also for heating small conservatories, green-houses, brooders, garages and other places where a small economical heater is necessary.



"Richmond" Tank Heater

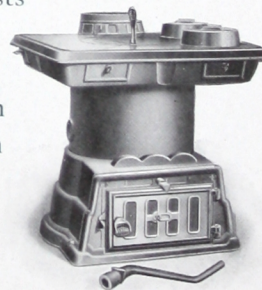
The large flat top of the "RICHMOND" Laundry Heater is intended for heating flat irons and for cooking or boiling clothes in a wash boiler or kettle. The top is provided with large covers or plates; by the removal of these, kettles or pots can be placed in direct contact with the fire.

The use of "RICHMOND" Tank and Laundry Heaters eliminates hard work, shortens working hours and saves many steps. It is not necessary to carry hot water from the kitchen to the bath room or laundry tubs, simply turn on a faucet when hot water is desired. A small fire with a few cents worth of coal a day will supply many gallons of hot water per hour and keep the water at a high temperature at all hours.

"RICHMOND" Tank and Laundry Heaters are constructed of cast iron as are the boilers described in the preceding pages. They are made in the same careful way and receive the same severe factory tests that are applied to the larger boilers.

On preceding pages under the heading "Material of Construction" we speak of the durability of cast iron as against steel and the advantages of cast iron surfaces in their relation to deposits of lime and other chemical properties. What we have said there as regards steam and hot water heating boilers, applies with greater force to tank and laundry heaters, since a greater quantity of water passes through such heaters. In tank and laundry heaters, water is continually being drawn from the system and fresh water supplied.

Cast iron is not subject to the deteriorating influence of rust which is destructive to sheet iron or steel. Lime or other chemical properties have no appreciable effect on cast iron, whereas they quickly corrode wrought iron or steel.



"Richmond" Laundry Heater

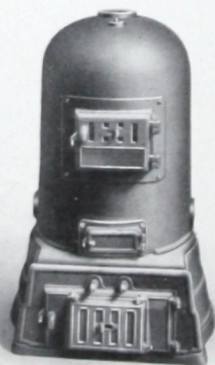
"RICHMOND"

"RICHMOND" water heaters hold an abundant supply of fuel and if necessary will keep water without continual attention at any desired temperature. Fire can easily be kept up over night. It will not be found necessary to feed the fire oftener than once or twice a day. The heaters are adaptable for all kinds of fuel including hard or soft coal, gas or wood.

The water section is a hollow cylinder with the fire surface arranged to come in direct contact with the fire. The inlet and outlet are so arranged that the water must travel around the fire and be subject to the full heating power before it is discharged into the supply pipe. The fire chamber is entirely surrounded with water and offers an enormous surface through which the heat may be absorbed.

In the large heaters, with oval instead of flat tops, the body proper forms a crown sheet over the fire. The heaters are practically self cleaning. There is very little flat surface in which soot or ashes can lodge and thus the surfaces rapidly and economically transmit heat to the water. The heaters are made in very few parts and can be erected in less than an hour's time. They may be set on the kitchen floor or near any good partition without danger of conflagration. They are usually set in basement and since they are quite small can be put in any out of the way place. The heaters can be connected to storage tanks set horizontally or vertically or to open wooden tanks in attics to which connections can be made to prevent such open tanks from freezing. Water to the tanks can be supplied by direct pressure from the water works system or where this is impractical can be pumped from a reservoir.

Sizes and capacities are listed on pages 78 and 79. Each heater is tested to 85 pounds hydrostatic pressure before leaving factory.



"Richmond" Tank Heater
Oval top

CHIMNEY FLUES

The chimney flue is a most important factor in the successful operation of a steam or hot water heating apparatus. Its functions are to produce a draft for proper combustion, to burn the gases from the fuel within the boiler, and to carry off the smoke.

Proper combustion and ignition and burning of the gases within the boiler depend upon the height; properly carrying off the smoke depends upon the size. The value of the flue depends on the volume of the passage due to area, and velocity due to height. Velocity alone is no proof of good draft, there must be also sufficient area to carry off the smoke.

Best results are obtained from the round chimney. Next in order of efficiency comes the square flue, while the oblong is the least effective. An oblong flue should never have less than eight inches depth, and better results will be obtained if the smoke pipe enters on narrow side, as this will allow the smoke and escaping gases more room in which to change their course from the horizontal smoke pipe to the vertical flue. A flue of less than eight inches depth will not allow freedom for this change.

The chimney should be at least eight inches in depth and never less in area than size of smoke pipe of boiler.

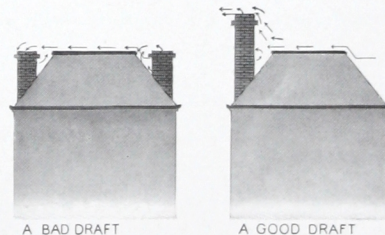
The area of flue should never be less than 9 or 10 inches round, or 8 x 12 rectangular, except for a small heating apparatus or tank heater, for which an 8 inch round or square flue of sufficient height will answer. It is good practice to have the chimney of a little greater area than that of smoke pipe from boiler.

The chimney into which the boiler smoke pipe connects should have no other opening, either above or below boiler smoke pipe opening.

The chimney should extend above the highest point of the roof of building and other immediate surrounding elevation. It should be located with reference to near-by buildings so that wind-currents will not form eddies and force the air downward in chimney.

Better draft is promoted by a revolving or shifting chimney cowl, which always turns the outlet away from adverse currents.

The chimney flue should be straight and the area maintained full size



"RICHMOND"



A GOOD AND BAD DRAFT

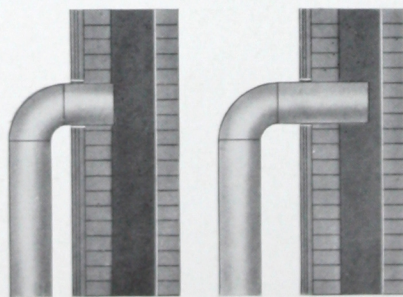
from base to top outlet, free from all obstructions, such as loose or protruding brick or mortar, free of sharp bends and offset, and if provided with cap, galvanized top or ornamentation of any sort, area of same should be the full area of flue.

The chimney if built of brick should be at least two four-inch courses in thickness, and the inside should be finished smooth to prevent loss of velocity by friction. If tile lined either round or square, the joints should be tightly cemented, or space between tile and brick-work filled in solid, to prevent open crevices between sections of tile.

The smoke pipe from boiler should not extend into the chimney beyond the inside surface of the flue, otherwise the protruding end of the pipe cuts down the area of the flue and interferes with the draft. The joint where the boiler smoke pipe enters chimney, (as well as where it fits smoke hood of boiler) should be made tight with boiler putty or asbestos cement.

If the chimney contains more than one flue, the division walls forming the boiler flue should extend from base to top of chimney, so that boiler flue is independent of the others throughout its entire length.

If the chimney is provided with a



A GOOD CONDITION

A BAD CONDITION

soot-pocket below the boiler smoke pipe opening, the clean-out door should fit tightly and always be closed.

The soot-pocket for the boiler flue or chimney should

be separated from and closed against openings from fireplaces or other connections which would check and prevent proper draft for boiler.

The boiler should be set as near the chimney as possible, for it is desirable to shorten length of smoke pipe.

The opening into the chimney should be slightly higher than the opening into the boiler, thus giving a slight rise or pitch in direction of the chimney.

The boiler should not be placed in too small a room in the cellar; it is well to have a large open space in front of the boiler to permit proper supply of air to the fire through the ashpit door.

How to Select a Chimney Flue

The selection of chimney flues for Heating Boilers must depend upon the judgment of the Heating Engineer. No tabular statements can be guaranteed, but it is believed that the table of Prof. R. C. Carpenter, on next page, will very much assist the engineer in selecting flues.

It is necessary that area and height, thickness of walls, general structure, and the position of the top outlet with reference to the building and other buildings near by, should be carefully noted and observed in selecting or building a flue.

The figures given under the varying heights of chimneys are diameter measurements in inches, or the side of a square — the theory being that the spiral ascending column of smoke and gases will make a twelve by twelve-inch flue no more extensive in practical working area than a twelve-inch round flue. Rectangular shapes may be used if the area is equal and the difference in width and length are not extreme.

"RICHMOND"

Data on Selection of Chimney Flues

Professor Carpenter's Rule

DIRECT RADIATION *		HEIGHT OF CHIMNEY FLUE					
Steam in Square Feet	Water in Square Feet	20 ft.	30 ft.	40 ft.	50 ft.	60 ft.	80 ft.
250	375	7.4	7.	6.7	6.4	6.2	6.
500	750	9.6	9.2	8.8	8.2	8.	6.6
750	1150	11.3	10.8	10.2	9.6	9.3	8.8
1000	1500	12.8	12.	11.4	10.8	10.5	10.
1500	2250	15.2	14.4	13.4	12.8	12.4	11.5
2000	3000	17.2	16.3	15.2	14.5	14.	13.2
3000	4500	20.6	18.5	18.2	17.2	16.6	15.8
4000	6000	23.6	22.2	20.8	19.6	19.	17.8
5000	7500	26.	24.6	23.	21.6	21.	19.4
6000	9000	28.4	26.8	25.	23.4	22.8	21.2
7000	10500	30.4	28.8	27.	25.5	24.4	23.
8000	12000	32.4	30.6	28.6	26.8	26.	24.2
9000	13500	34.	32.4	30.4	28.4	27.4	25.6
10000	15000	37.	34.	32.	30.	28.6	27.

* When a considerable amount of INDIRECT radiation is to be used, increased Boiler capacity is necessary, and in many cases such demands require a larger chimney flue for the same number of square feet of radiation used.

The following table of chimney flue sizes is commonly used with good results. This does not take into consideration the varying heights of stacks, yet is recommended as reliable in average conditions:

Rule Commonly Used

DIRECT RADIATION *		SIZE OF FLUE	
Steam in Square Feet	Water in Square Feet	Round. Inches	Square. Inches
250	400	8	8 x 8
300	500	8	8 x 8
400	700	8	8 x 8
500	850	10	8 x 12
600	1000	10	8 x 12
700	1200	10	8 x 12
800	1350	12	12 x 12
900	1500	12	12 x 12
1000	1700	12	12 x 12
1200	2100	12	12 x 12
1400	2400	14	12 x 16
1600	2700	14	12 x 16
1800	3000	14	12 x 16
2000	3400	14	12 x 16
2200	3700	16	16 x 16
3000	5100	16	16 x 16
3500	5900	18	16 x 20
5000	8500	18	16 x 20

* When a considerable amount of INDIRECT radiation is to be used, increased Boiler capacity is necessary and in many cases such demands require a larger chimney flue for same number of square feet of radiation used.

CONCLUSION

If interested in the heating of the home, either the old or the new, or of any other structure, whether apartments, mercantile building, church or school house, a letter or postal to us will place you in communication with responsible and practical contractors in your vicinity, who will be pleased to submit estimates on complete heating plants including "RICHMOND" Boilers, Radiators and Accessories.

If your present mode of heating is unsatisfactory — if the fuel bill is too high, if the maintenance requires too much time, if the repair bill is unreasonable, notify us. The trouble can be remedied. Heating is a science; the scientific and mechanical application of its principles to your building will insure an apparatus which gives warmth and comfort and is economical, satisfactory — PERFECT.

If the heating contractor is already selected refer this catalogue to him and request his figures on "RICHMOND" product. Quotations will be gladly sent on request.

With "RICHMOND" apparatus installed in the structure the heat question is solved. It is the BEST. Tested under severe hydrostatic pressure it fulfills even the rigid requirements insisted upon by the government engineers. And the cost of "RICHMOND" apparatus is as low as the lowest.

M. F. RAFTREE

TELEPHONE CENTRAL 1438

H. P. WILBER

**Raftree & Wilber
FIRE INSURANCE**

159 LA SALLE STREET

CHICAGO May 1, 1909.

Mr. W. G. Jacob,

Chicago, Ills.

Dear Sir:-

During the past ten years I have erected over one hundred buildings in Chicago, including stores, apartments, flats and residences in which I have used eight different makes of steam and water heating boilers.

My experience during this time has proved to me conclusively that of all those used, the Richmond steam and water boilers have given the best satisfaction. They are the most economical in the consumption of fuel, easiest to operate and have required practically no repairs.

I have just contracted for steam heating apparatus for nine buildings to be erected this Summer. In these, only Richmond boilers and radiators will be used.

Yours truly,

M. F. Raftree

"RICHMOND"

MR. AUGUST HEIMANN,
New Haven, Conn.

DEAR SIR:

I take pleasure in recommending to all house owners the "Richmond" Round Boiler for house heating. It is easy to regulate and is in every way perfect. There is no other heating apparatus that could take its place, in my opinion. It gives the maximum of heat for the minimum of coal.

771 Russell St., New Haven, Conn.

Very truly yours,

E. P. CARLSON.

MR. A. KNOWLES,
New Bedford, Mass.

DEAR SIR:

I am writing to let you know how I am getting along with the "Richmond" Hot Water Heater which you put in for me five years ago. I have been inquiring ever since about different makes of hot water heaters, that is, how they run, how much coal they use, etc., and after this close investigation, to do justice to the "Richmond" Heater I must say that it is above all that I have been inquiring about in economy of fuel, even distribution of heat, easiness of regulation and efficiency. I think it is the ideal heating apparatus for any home.

My house is a cottage of nine rooms, besides a large front entry as well as a hallway, and I keep them all warm day and night at an average of 70 degrees. My cellar is also warm and I can go through an ordinary winter with less than five tons of coal. If there be anyone doubtful about this statement, please send him to me, or have him write me, and I will prove the truth of it.

Respectfully yours,

135 Brock Ave., New Bedford.

MANUEL ALEXANDER.

ROCK RIDGE,
A School for Boys.

It gives me pleasure to state my experience with "Richmond" Boilers. We now have three of this make, two for hot water service in heating two of our dormitories, and a larger one for steam service at our athletic building. One has been in use six years, one four years and the other one year. Each has come up to expectations in every way, while the oldest one is now regularly doing considerably more work than was expected of it when it was installed. All are easily handled, no one has ever given any trouble worth mentioning and the repairs on all three have been insignificant. These boilers are of extreme simplicity, and I believe this simplicity would render them easily repaired should they give out in any part. All three I regard as highly efficient for the amount of fuel consumed. We have used hard coal, soft coal and coke.

Wellesley Hills, Massachusetts.

DR. G. R. WHITE, Principal.

THE GARRICK THEATRE.

ST. LOUIS, MO., December 22, 1908.

We have always found our heating apparatus to give first class service. I do not hesitate in recommending the boilers we have here in use.

Yours truly,

DAN. FISHELL, Mgr. Garrick Theatre.

"RICHMOND"

MESSRS. CLARK BROS.,
Richford, Vt.

DEAR SIR:

More than six years ago you installed the "Richmond" Steam Heating System here in the Canadian Pacific Ry. Station, a three-story building above basement, seventy feet long and thirty-two feet wide. There are eleven and one-half feet from floor to ceiling in each story.

Previously we had a horizontal boiler, from which results were very unsatisfactory. The "Richmond" 93-B Upright Boiler you installed has been in use for more than six years, does not require more than one-half the fuel required by the former boiler and gives entire satisfaction. I feel free to commend your "Richmond" Boiler as the most economical and satisfactory heater I know anything about.

Yours truly,

P. McGETTRICK, Agt. Can. Pac. Ry.

THE McCrum-Howell Co.,
New York, City.

DEAR SIR:

In reply to your favor of Sept. 12th, regarding the "Richmond" Boiler, installed in my house, by Mr. Newton, I take pleasure in stating that the Steam Plant has given most excellent satisfaction. I am contemplating building another house and am going to install the "Richmond" Boiler.

Yours truly,

Room 715, Whitehall Bldg., N. Y. City.

C. W. DILL.

THE McCrum-Howell Co.,
New York, City.

GENTLEMEN:

The Baptist Temple of Brooklyn, N. Y., had two of the large-sized "Richmond" Steam Heaters installed last year and they have proved entirely satisfactory.

Very truly yours,

Brooklyn Heights.

C. R. HETFIELD, Mgr. Hotel St. George.

THE McCrum-Howell Co.,
New York, N. Y.

GENTLEMEN:

The "Richmond" Boiler installed in my building by the Scott Heating Co., of this city, two years ago has been given a fair test, and found to be satisfactory in every particular.

Yours very truly,

Scranton, Pa.

PETER E. LALLY.

THE SCOTT HEATING Co.,
Scranton, Pa.

GENTLEMEN:

In reply to your favor asking me for my opinion of "Richmond" Boilers, I gladly certify that they give entire satisfaction and I would advise others to use them.

Yours respectfully,

Sacred Heart Church, 1213 Prospect Ave., Scranton, Pa.

REV. S. ZYCHEWICH.

"RICHMOND"

MR. AUGUST HEIMANN,
New Haven, Conn.

DEAR SIR:

I am very much pleased with the "Richmond" Round Heater which I have had in use for heating my greenhouses for the last four years and shall certainly recommend your heaters very highly. No one will make a mistake in getting one.

New Haven, Conn.

Yours respectfully,

H. TRISCH.

FISKE & Co.,
Natick, Mass.

GENTLEMEN:

About five years ago at your suggestion and on your recommendation, I tried one of the "Richmond" Heaters. Previous to that time I knew nothing about the heater and in fact very little about heaters of any kind. During the five years it has been in use, it has proved very satisfactory, being easily cared for, economical in the use of coal and efficient in keeping the house warm and comfortable.

It does not seem to me that it needs to be improved upon.

Natick, Mass.

Very truly yours,

P. H. COONEY.

ROSS & WENTWORTH.

Manufacturers and Wholesale Dealers, Pine, Hemlock and Hardwood Lumber.

BAY CITY, MICH., May 25, 1909.

In reply to your letter of yesterday, inquiring about the "Richmond" Boiler. Would advise that the "Richmond" Boiler in my house gives good satisfaction, and heats the house comfortably.

I have a ten-room house, located on a corner, and requires about 15 tons of hard coal for a winter.

Trusting the above may be of some use to you, I remain,

Yours very truly,

(Signed) N. R. WENTWORTH.

ST. FRANCIS HOSPITAL.

BURLINGTON, IOWA, January 23, 1909.

DEAR MADAM:

Your favor of January 22d received, and in reply will say we are putting in a 3,500 square feet "Richmond" Boiler in our Hospital for water, and expect to have it in operation by February 1st. We, however, have a 2,500 square feet "Richmond" Boiler in our Hospital in Bloomington, Ill., that has given entire satisfaction. This is for steam.

We think the "Richmond" Boilers are equal to any in the market and in case of any cracked section occurring in the winter the remaining sections can be used until the cracked section can be replaced. In our judgment this feature is very important, as this cannot be done with any push nipple boiler.

Yours truly,

SISTER M. CUNIGUNDA, Superior St. Francis Hospital.

"RICHMOND"

COOK COUNTY INSTITUTIONS DUNNING, ILL.

HOSPITAL FOR INSANE, HOSPITAL FOR CONSUMPTIVES INFIRMARY.

DUNNING, June 10, 1909.

CAMERON-SCHROTH-CAMERON Co.
189 Michigan St., Chicago.

GENTLEMEN:

The "Richmond" Hot Water Boiler installed in the Tuberculosis Hospital at Dunning, Ills., has proven very satisfactory since being installed three years ago. Repairs have been nominal. It is economical in the consumption of fuel and does not require expert labor in its care; in fact it is the best of many hot water boilers that have come under my supervision.

Yours very truly,

(Signed) W. J. DOWNEY,
Chief Engineer, County Institutions, Dunning, Ills.

THE JOLIET DRY GOODS CO.

200, 202, 204 Chicago Street.

CAMERON-SCHROTH-CAMERON Co.
189 Michigan St., Chicago.

JOLIET, ILL., May 25, 1909.

GENTLEMEN:

As to the "Richmond" Boiler referred to in your letter of the 24th, will say that it has been very satisfactory. Our engineer claims he uses less coal and has had no repairs since its installation — three years ago.

(Signed) JOLIET DRY GOODS CO.

ST. JOSEPH'S HOSPITAL.

CONDUCTED BY SISTERS OF THE THIRD ORDER OF ST. FRANCIS, JACKSON STREET.

BLOOMINGTON, ILL., January 22, 1909.

DEAR SIR:

Your letter received. In regard to the "Richmond" Boilers, we must say they give satisfaction in every way. We have been using them now in both buildings, old and new hospital, and have no trouble whatever in heating the buildings. They are also very easily kept clean. I think you will make no mistake in getting the "Richmond" boiler.

Yours truly,

POOR SISTERS OF ST. FRANCIS.

DECATUR PUBLIC SCHOOLS.

DECATUR, ILL., December 23, 1908.

DEAR SIR:

The "Richmond" Boiler has rendered very satisfactory service here. It is now in use in three schools. It is easy to learn to operate and is very economical.

Very truly,

H. B. WILSON, Secretary.

"RICHMOND"

CARNEGIE TECHNICAL SCHOOLS, PITTSBURG, PA.
SCHOOL OF APPLIED SCIENCE.

January 9, 1909.

DEAR MADAM:

Your letter of the 29th ult, at hand asking us of our experience with the "Richmond" Boiler.

Our experience is as follows: We specified and installed two "Richmond" Boilers in the Margaret Morrison Carnegie School for Women of the Carnegie Technical Schools for the purpose of heating that building and found after two years of experience with this boiler that it is just about what the makers claim for it.

It is a cast iron boiler and would undoubtedly be a good one for residence heating also.

Very respectfully,

THOS. F. PAYNE,
Instructor in Plumbing.

BIKLEN, WINZER GROCER CO.
Wholesale Grocers.

BURLINGTON, IOWA, January 23, 1909.

DEAR SIR:

In reply to your favor of the 16th inst. received a day or two ago, will state that the "Richmond" Boiler, which I have been using for the last couple of years, is very satisfactory in every respect, and I do not believe you will miss it if you buy one of this make.

Our house is quite exposed and we have had no trouble whatever during the cold weather to keep it very comfortable and without using an exorbitant amount of coal.

Yours truly,

A. G. OBERLE.

F. C. FISCHER, FLORIST.

EVANSTON, ILL., December 26, 1908.

DEAR SIR:

In response to yours of the 22d, I let you know that I own and have been using a "Richmond" Boiler in my greenhouses and take great pleasure in recommending it to anybody that may want a boiler. In my line of business I had a good deal of experience with different boilers, but I have found none I like as well as the "Richmond."

If you should desire any more information, let me know and I assure you it will be a pleasure to me to be of any service to you. On account of holiday rush this was not answered before, which I beg to excuse.

Yours truly,

FRED C. FISCHER.

MR. A. KNOWLES,
New Bedford, Mass.

DEAR SIR:

Having used the "Richmond" Water Heater in my house for ten years, I am quite free to say that it has given very satisfactory results. It has done all that was guaranteed for it. Mine will do as much heating for the amount of coal burned as any other I have heard of and I should recommend the "Richmond" Hot Water Heater to any one that is looking for a first-class article.

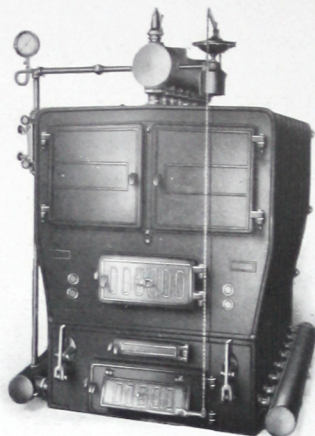
Yours truly,

New Bedford, Mass., 128 Front St.

WILLIAM H. C. TAYLOR.

"RICHMOND"

"RICHMOND" BOILERS



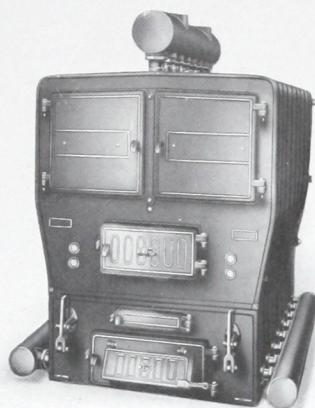
42-9-S. Boiler

Sectional Steam Boilers, Water Base

No.	Area Fire Pot Inches	Smoke Collar Inches	Sections	Water Line Inches	Height to Top of Supply Inches	Total Length with Smoke Box Ins.	Total Width Inches	Size Supply Inches	Size Return Inches	Rating Sq. ft.	Price List
204-S	20 x 19	10	4	46	61	34	40	1-3	2-3	525	\$238.00
205-S	20 x 25	10	5	46	61	40	40	2-3	2-3	675	302.50
206-S	20 x 31	10	6	46	61	46	40	2-3	2-3	850	355.00
207-S	20 x 37	10	7	46	61	52	40	2-3	2-3	1,000	400.00
208-S	20 x 43	10	8	46	61	58	40	2-3	2-3	1,150	445.00
305-S	28 x 28	12	5	50	68	45	46	1-4	2-3	1,200	460.00
306-S	28 x 35	12	6	50	68	52	46	2-4	4-3	1,400	520.00
307-S	28 x 42	12	7	50	68	59	46	2-4	4-3	1,625	587.00
308-S	28 x 49	12	8	50	68	66	46	2-4	4-3	1,900	670.00
309-S	28 x 55	12	9	50	68	73	46	2-4	4-3	2,100	730.00
3010-S	28 x 62	12	10	50	68	80	46	2-4	4-3	2,350	790.00
42- 6-S	42 x 35	15	6	56 1/2	78	52	64	2-5	3-4	2,400	800.00
42- 7-S	42 x 42	15	7	56 1/2	78	59	64	2-5	3-4	2,800	880.00
42- 8-S	42 x 49	15	8	56 1/2	78	66	64	2-6	4-4	3,350	1,004.00
42- 9-S	42 x 55	15	9	56 1/2	78	73	64	2-6	4-4	3,900	1,125.00
42-10-S	42 x 62	18	10	56 1/2	78	80	64	2-6	4-4	4,400	1,228.00
42-11-S	42 x 69	18	11	56 1/2	78	87	64	2-6	4-4	4,900	1,324.00
42-12-S	42 x 76	18	12	56 1/2	78	94	64	2-6	4-4	5,400	1,424.00
42-13-S	42 x 82	18	13	56 1/2	78	101	64	2-6	4-4	5,900	1,524.00
42-14-S	42 x 89	18	14	56 1/2	78	108	64	2-6	4-4	6,400	1,624.00

"RICHMOND"

"RICHMOND" BOILERS



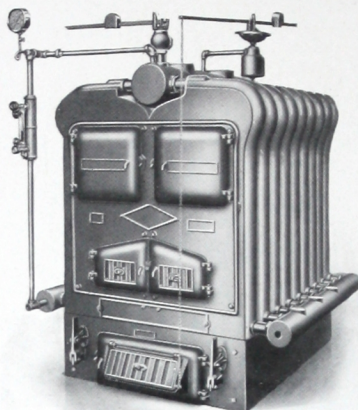
42-9-W. Boiler

Sectional Water Boilers, Water Base

No.	Area Fire Pot Inches	Smoke Collar Inches	Sections	Height to Top Supply Outlet Inches	Total Length with Smoke Box Ins.	Total Width Inches	Size Supply Inches	Size Return Inches	Rating Sq. ft.	Price List
204-W	20 x 19	10	4	61	34	40	1-3	2-3	850	\$ 228.00
205-W	20 x 25	10	5	61	40	40	2-3	2-3	1,100	292.50
206-W	20 x 31	10	6	61	46	40	2-3	2-3	1,400	345.00
207-W	20 x 37	10	7	61	52	40	2-3	2-3	1,650	390.00
208-W	20 x 43	10	8	61	58	40	2-3	2-3	1,900	435.00
305-W	28 x 28	12	5	68	45	64	2-6	4-4	2,000	450.00
306-W	28 x 35	12	6	68	52	46	1-4	2-3	2,350	510.00
307-W	28 x 42	12	7	68	59	46	2-4	4-3	2,675	577.00
308-W	28 x 49	12	8	68	66	46	2-4	4-3	3,150	660.00
309-W	28 x 55	12	9	68	73	46	2-4	4-3	3,450	720.00
3010-W	28 x 62	12	10	68	80	46	2-4	4-3	3,900	770.00
42- 6-W	42 x 35	15	6	78	52	46	2-4	4-3	3,975	780.00
42- 7-W	42 x 42	15	7	78	59	64	2-5	3-4	4,625	860.00
42- 8-W	42 x 49	15	8	78	66	64	2-5	3-4	5,525	984.00
42- 9-W	42 x 55	15	9	78	73	64	2-6	4-4	6,450	1,105.00
42-10-W	42 x 62	18	10	78	80	64	2-6	4-4	7,250	1,208.00
42-11-W	42 x 69	18	11	78	87	64	2-6	4-4	8,100	1,304.00
42-12-W	42 x 76	18	12	78	94	64	2-6	4-4	8,900	1,404.00
42-13-W	42 x 82	18	13	78	101	64	2-6	4-4	9,750	1,504.00
42-14-W	42 x 89	18	14	78	108	64	2-6	4-4	10,575	1,604.00

"RICHMOND"

"RICHMOND" BOILERS



407-S. Boiler

Twin Section, Separate Base, Steam Boilers

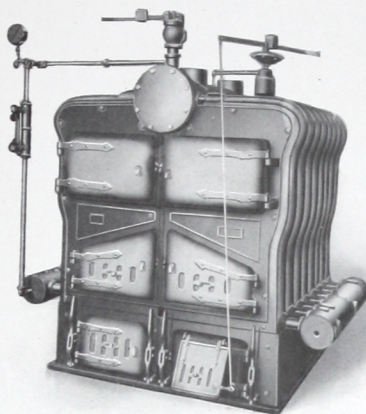
No.	Area Fire Pot Inches	Smoke Collar In.	Sections	Water Line Inches	Height to Out-let Ins.	Length with Smoke Box and Front Ins.	Total Width Inches	Size Supply Inches	Size Return Inches	Rating Sq. ft.	Price List
406-S	38 x 36	10 $\frac{5}{8}$ x 19	6	58	73	58	63	2-5	4-4	2,200	760.00
407-S	38 x 43	10 $\frac{5}{8}$ x 19	7	58	73	65	63	2-5	4-4	2,625	845.00
408-S	38 x 50	10 $\frac{5}{8}$ x 19	8	58	73	72	63	2-5	4-4	3,000	927.00
409-S	38 x 57	10 $\frac{5}{8}$ x 19	9	58	73	79	63	2-5	4-4	3,400	1,018.00
4010-S	38 x 64	10 $\frac{5}{8}$ x 19	10	58	73	86	63	2-6	4-4	3,800	1,098.00
4011-S	38 x 71	10 $\frac{5}{8}$ x 19	11	58	73	93	63	2-6	4-4	4,200	1,190.00
4012-S	38 x 78	10 $\frac{5}{8}$ x 19	12	58	73	100	63	2-6	4-4	4,500	1,250.00

Twin Section, Separate Base, Water Boilers

406-W	38 x 36	10 $\frac{5}{8}$ x 19	6		73	58	63	2-5	4-4	3,650	740.00
407-W	38 x 43	10 $\frac{5}{8}$ x 19	7		73	65	63	2-5	4-4	4,325	825.00
408-W	38 x 50	10 $\frac{5}{8}$ x 19	8		73	72	63	2-5	4-4	5,000	907.00
409-W	38 x 57	10 $\frac{5}{8}$ x 19	9		73	79	63	2-5	4-4	5,600	998.00
4010-W	38 x 64	10 $\frac{5}{8}$ x 19	10		73	86	63	2-6	4-4	6,250	1,078.00
4011-W	38 x 71	10 $\frac{5}{8}$ x 19	11		73	93	63	2-6	4-4	6,925	1,170.00
4014-W	38 x 78	10 $\frac{5}{8}$ x 19	12		73	100	63	2-6	4-4	7,425	1,230.00

"RICHMOND"

"RICHMOND" BOILERS



53 Series

Twin Section, Separate Base, Steam Boilers

No	Area Fire Pot Inches	Smoke Collar In.	Sections	Water Line Inches	Height to Out-let Ins.	Length with Smoke Box and Front Ins.	Total Width Inches	Size Supply Inches	Size Return Inches	Rating Sq. Ft.	Price List
537-S	51 x 43	15 x 26½	7	60½	75	67	84	2-6	2-6	4,000	\$1,144.00
538-S	51 x 50	15 x 26½	8	60½	75	74	84	2-6	2-6	4,600	1,264.00
539-S	51 x 57	15 x 26½	9	60½	75	81	84	2-6	2-6	5,150	1,374.00
5310-S	51 x 64	15 x 26½	10	60½	75	88	84	3-6	3-6	5,700	1,484.00
5311-S	51 x 71	15 x 26½	11	60½	75	95	84	3-6	3-6	6,400	1,624.00
5312-S	51 x 78	15 x 26½	12	60½	75	102	84	3-6	3-6	7,200	1,784.00
5313-S	51 x 85	15 x 26½	13	60½	75	109	84	3-6	3-6	7,950	1,934.00
5314-S	51 x 92	15 x 26½	14	60½	75	116	84	3-6	3-6	8,450	2,034.00
5315-S	51 x 99	15 x 26½	15	60½	75	123	84	2-8	4-6	8,950	2,134.00
5316-S	51 x 106	15 x 26½	16	60½	75	130	84	2-8	4-6	9,450	2,234.00

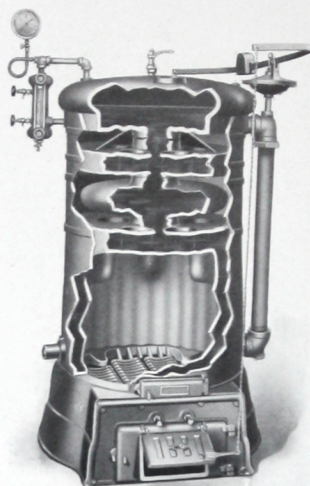
Twin Section, Separate Base, Water Boilers

537-W	51 x 43	15 x 26½	7		75	67	84	2-6	2-6	6,600	1,124.00
538-W	51 x 50	15 x 26½	8		75	74	84	2-6	2-6	7,550	1,244.00
539-W	51 x 57	15 x 26½	9		75	81	84	2-6	2-6	8,475	1,354.00
5310-W	51 x 64	15 x 26½	10		75	88	84	3-6	3-6	9,375	1,464.00
5311-W	51 x 71	15 x 26½	11		75	95	84	3-6	3-6	10,575	1,604.00
5312-W	51 x 78	15 x 26½	12		75	102	84	3-6	3-6	11,875	1,764.00
5313-W	51 x 85	15 x 26½	13		75	109	84	3-6	3-6	13,000	1,914.00
5314-W	51 x 92	15 x 26½	14		75	116	84	3-6	3-6	13,900	2,014.00
5315-W	51 x 99	15 x 26½	15		75	123	84	2-8	4-6	14,800	2,114.00
5316-W	51 x 106	15 x 26½	16		75	130	84	2-8	4-6	15,700	2,214.00

NOTE.— Each boiler furnished complete with trimmings and fire tools.

"RICHMOND"

"RICHMOND" BOILERS



420-S. Boiler

Round Sectional Steam Boilers

No.	Fire Pot Inches	Water Line Inches	Height Inches	Smoke Col- lar Ins.	Flow Tapping	Return Tapping	Rating Sq. Ft. (Note)	Price List
217-S	17	41	45	7	1-2½	1-2	250	\$132.00
317-S	17	46	50	7	1-2½	1-2	300	149.50
417-S	17	51	55	7	1-2½	1-2	350	167.00
220-S	20	43	46	8	1-3	1-2½	325	158.00
320-S	20	49	52	8	1-3	1-2½	400	193.00
420-S	20	54	57	8	1-3	1-2½	450	206.50
* 520-S	20	59	62	8	1-3	1-2½	500	219.50
223-S	23	44	47	9	1-3	1-2½	525	226.00
323-S	23	50	53	9	1-3	1-2½	575	240.00
423-S	23	55	58	9	1-3	1-2½	625	277.50
* 523-S	23	61	64	9	1-3	1-2½	675	293.00
326-S	26	51	54	10	1-4	1-3	750	316.00
426-S	26	58	61	10	1-4	1-3	800	331.00
* 526-S	26	64	68	10	1-4	1-3	850	346.00
329-S	29	52	56	10	1-5	1-3½	1,000	389.50
429-S	29	58	62	10	1-5	1-3½	1,100	419.00
* 529-S	29	64	68	10	1-5	1-3½	1,200	449.00
* 629-S	29	70	74	10	1-5	1-3½	1,300	477.00

* For Hard Coal only.

Soft Coal: When Soft Coal is to be used for fuel, we recommend the use of a Boiler one size larger than would be required for Hard Coal.

NOTE.— Each boiler furnished complete with trimmings and fire tools.

"RICHMOND"

"RICHMOND" BOILERS



323-W. Boiler

Round Sectional Water Boilers

No.	Fire Pot Inches	Height Inches	Smoke Col- lar Inches	Flow Tapping	Return Tapping	Rating Sq. Ft.	Price List
217-W	17	41	7	2-2	2-2	400	\$114.00
317-W	17	46	7	2-2	2-2	500	140.50
417-W	17	51	7	2-2	2-2	575	158.00
220-W	20	42	8	2-2½	2-2½	550	149.50
320-W	20	48	8	2-2½	2-2½	650	184.00
420-W	20	53	8	2-2½	2-2½	750	197.00
* 520-W	20	59	8	2-2½	2-2½	825	210.50
223-W	23	43	9	2-2½	2-2½	875	217.50
323-W	23	49	9	2- ½	2-2½	950	231.50
423-W	23	55	9	2-2½	2-2½	1,025	267.50
* 523-W	23	61	9	2-2½	2-2½	1,100	283.00
326-W	26	51	10	2-3	2-3	1,250	306.00
426-W	26	57	10	2-3	2-3	1,325	321.00
* 526-W	26	64	10	2-3	2-3	1,400	336.00
329-W	29	52	10	2-3½	2-3½	1,650	380.00
429-W	29	58	10	2-3½	2-3½	1,825	409.00
* 529-W	29	65	10	2-3½	2-3½	2,000	438.50
* 629-W	29	71	10	2-3½	2-3½	2,150	467.50

* For Hard Coal only.

Soft Coal: When Soft Coal is to be used for fuel, we recommend the use of a Boiler one size larger than would be required for Hard Coal.

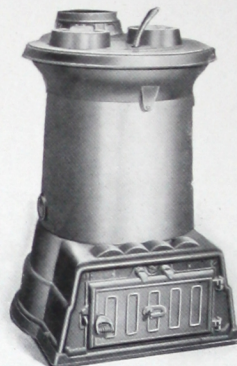
NOTE.— Each boiler furnished complete with fire tools.

"RICHMOND"

"RICHMOND" TANK HEATERS



621. Laundry Stove



637. Tank Heater

Laundry Stoves

No.	Diameter Fire Pot Inches	Height Inches	Flow and Return Tappings, Inches	Smoke Pipe, Inches	Top	‡ Tank Capacity Gallons	Price List
* 620	11	27	1 1/4	6	25 x 25	80	\$34.50
621	11	27	1 1/4	6	25 x 25	125	42.50
622	13	27	1 1/4	6	25 x 28	200	53.00

Flat Top Tank Heaters

No.	Diameter Fire Pot Inches	Height Inches	Flow and Return Tappings, Ins.	Smoke Pipe, Inches	Rating Sq. Ft.	‡ Tank Capacity Gallons	Price
* 630	11	27	1 1/4	6	60	80	\$34.50
631	11	27	1 1/4	6	75	100	38.00
632	11	34	1 1/2	6	115	150	45.50
633	13	27	1 1/2	6	125	200	53.00
† 634	11	40	1 1/2	6	140	225	59.00
635	13	34	1 1/2	6	150	275	66.50
† 636	13	41 1/2	1 1/2	6	175	300	71.50
637	15	36	2	7	200	350	81.00
† 638	15	43	2	7	235	400	90.00

* These heaters are provided with half ring water sections and half ring fire brick.

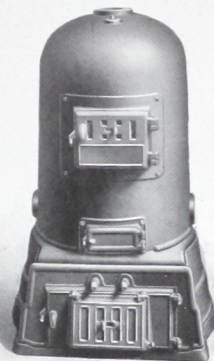
† These heaters are provided with extra deep fire pots.

‡ The tank capacities (per gallons) given above are based upon the understanding that sufficient Storage Tank-capacity be used in connection with the Heater, and represent the estimated size of Tanks which experience has shown will supply in ordinary use.

For greater requirements special increased capacity should be provided.

"RICHMOND"

"RICHMOND" TANK HEATERS



640. Tank Heater

Oval Top Tank Heaters

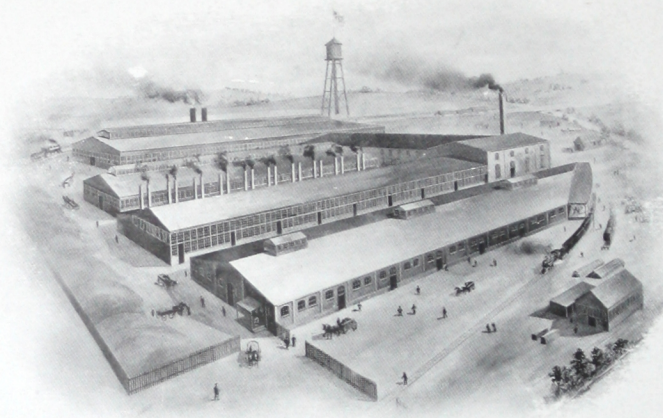
No.	Diameter Fire Pot, Inches	Height Inches	Flow Tap- pings, Ins.	Return Tappings, Inches	Smoke Pipe Inches	Rating, Sq. Ft.	† Tank Capacity Gallons	Price
640	13	40	1-2	2-2	6	250	450	\$100.00
† 641	13	40	1-2	2-2	6	275	500	110.00
642	15	43	1-2½	2-2	7	325	550	120.00
† 643	15	43	1-2½	2-2	7	350	600	129.00
644	17	45	1-2½	2-2	7	400	675	148.50
† 645	17	45	1-2½	2-2	7	425	775	169.00
650	16	43	1-2½	2-2	6	375	625	134.00
* 651	16	50	1-2½	2-2	6	500	725	159.00
652	19	45½	1-2½	2-2½	7	575	825	179.00
* 653	19	52½	1-3	2-2½	7	700	925	199.00
654	22	47½	1-3	2-2½	8	750	1,000	214.00

† The Tank capacities (per gallons) given above are based upon the understanding that sufficient Storage Tank-capacity be used in connection with the Heater, and represent the estimated size of Tanks which experience has shown will supply in ordinary use. For greater requirements special increased capacity should be provided.

* These Heaters are provided with extra deep fire pots.

† These Heaters have drop tubes.

"RICHMOND"



Uniontown, Pa.

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"RICHMOND"

"RICHMOND" ENAMELED WARE IS UNSURPASSED

B a t h T u b s — L a v a t o r i e s — S i n k s

Quality in Porcelain Enameled Ware counts, and "RICHMOND" quality counts most.

"RICHMOND" quality is not only a guarantee of wear value, but it gives you the widest range in modish designs, as well as in simple and substantial patterns. And these are important essentials, for the modern bath room should harmonize in all its details — each fixture should fit in perfectly with the general decorative or embellishment scheme.

Each piece of "RICHMOND" Enameled Ware is the product of the most skilled artisanship — each must be perfect to pass the strictest of factory and laboratory tests. These are some of the reasons why "RICHMOND" Enameled Ware continues to give satisfaction year after year to careful, painstaking dealers and discriminating users.

Each piece of "RICHMOND" Enameled Ware bears the "RICHMOND" Guarantee Label — be sure to look for it. This will be your protection against inferiority — your assurance that you are getting the best.

In first cost "RICHMOND" Enameled Ware will stand the most searching comparisons, but it will show most profitable savings under hard usage and daily wear. Here you will find "RICHMOND" quality constantly demonstrating its sterling worth and great economy.

"RICHMOND"



Plate E 200

Here is a "RICHMOND" Porcelain Enameled Ware Bath Tub unpretentious in design, yet carrying a grace of outline and utility rarely found together. Its dimensions are not extreme in any particular, yet its medium length and depth and general outline assure its perfect adaptability to meet fully the average requirements. It is a perfect "RICHMOND" product and is a beautiful example of Porcelain Enameled Ware.

	Dimensions
Width over Rim.....	26 inches
Width of Roll Rim.....	2 ½ inches
Height to top of Rim.....	22 inches
Depth inside.....	16 ½ inches



Plate E 210

Note the appearance of unusual depth of this "RICHMOND" Porcelain Enameled Bath Tub—its broad and generous lines throughout. This pattern will conform to the most elaborately conceived bath room arrangement. The remarkable spotless white of "RICHMOND" Porcelain Enameled Ware finds ample verification in this superb piece.

	Dimensions
Width over Rim.....	30 inches
Width of Roll Rim.....	3 inches
Height to top of Rim.....	22 ½ inches
Depth inside.....	17 inches

"RICHMOND"



A "Richmond" equipped bath-room guarantees the utmost of luxuriousness in detail and harmony

In this illustration please note the Lavatory and Bath Tub — both are "RICHMOND" products. Observe how thoroughly and completely they fit into the general arrangement. The outlines of these pieces give appearance of substance — solid porcelain can carry no greater grace of outline or create a more desirable appearance of delightfulness and invitation.

If you seek Porcelain Enamelled Ware of most perfect detail, of snowy whiteness free from all suggestion of blemish and with depth and generous outline equal to the most expensive porcelain, specify "RICHMOND."

"RICHMOND"

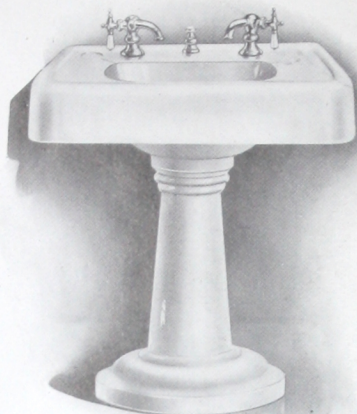


Plate E 610

"RICHMOND" Porcelain Enameled Lavatory, with Slab, "D" Pattern Bowl and Apron all in one piece, Porcelain Enameled all over Pedestal, with Lift Waste.

	Dimensions
Square Slab.....	18 x 24 inches
Bowl.....	11 x 15 inches
Plate E 610, enameled all over with Lift Waste less all Nickel-plated Fittings.....	\$26.00

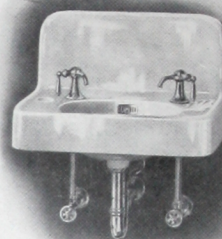


Plate E 620

"RICHMOND" Porcelain Enameled Lavatory, with Slab, Apron, "D" Pattern Bowl, Overflow and Back all in one piece, Concealed Wall Hanger, Nickel-plated Waste Plug, Rubber Stopper, Chain Stay and Chain.

	Dimensions
Slab.....	18 x 24 inches
Bowl.....	12 x 15 inches
Height of Back.....	10 inches
Size.....	18 x 24 inches
Plate E 620, enameled exterior, less all Nickel-plated Fittings.....	\$16.50



Plate E 630

"RICHMOND" Porcelain Enameled Lavatory, with Slab, Apron, Oval Bowl, Overflow and Back all in one piece, Concealed Wall Hanger, Nickel-plated Waste Plug, Rubber Stopper, Chain Stay and Chain.

	Dimensions
Slab.....	18 x 24 inches
Bowl.....	12 x 15 inches
Height of Back.....	10 inches
Size.....	18 x 24 inches
Plate E 630, enameled exterior, less all Nickel-plated Fittings.....	\$14.00

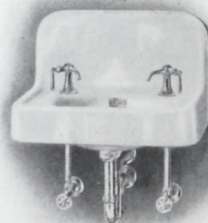
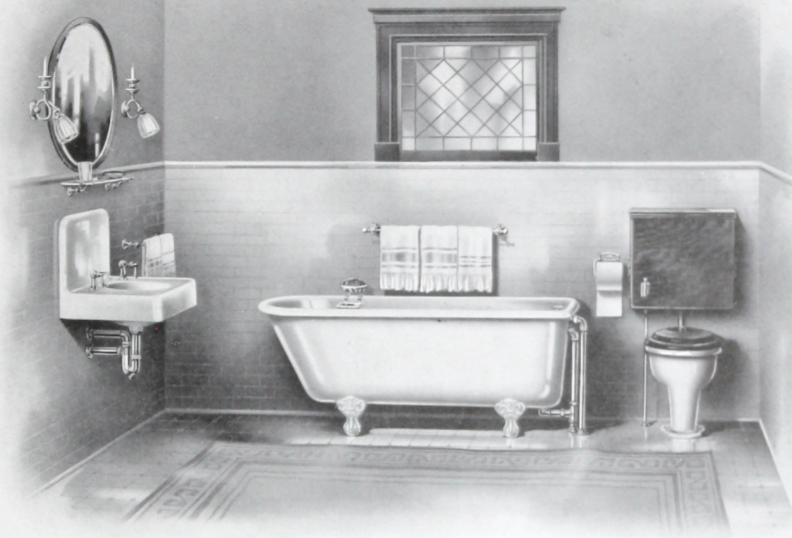


Plate E 730

"RICHMOND" Porcelain Enameled Lavatory, with Slab, Apron, "D" Pattern Bowl, Overflow and Back all in one piece, Concealed Wall Hanger, Nickel-plated Waste Plug, Rubber Stopper, Chain Stay and Chain.

	Dimensions
Slab.....	18 x 24 inches
Bowl.....	12 x 15 inches
Height of Back.....	10 1/2 inches
Slab.....	20 x 24 inches
Bowl.....	12 x 15 inches
Height of Back.....	12 inches
Sizes.....	18 x 24 20 x 24
Plate E 730, enameled exterior less all Nickel-plated Fittings.....	\$14.00 \$17.50

"RICHMOND"



"Richmond" Enameled Ware renders this moderate bath-room equipment delightfully attractive

The most desirable Bath Room is that one which most conspicuously typifies cleanliness and spotless care. To secure these does not require elaborate fixtures and appurtenances. Simply choose the dominating pieces of the equipment — as the tub and lavatory — with an eye to grace and solidarity. Avoid tinsel and fads. Select the plain substance of real worth.

"RICHMOND" Porcelain Enameled Ware provides just as great value in the simpler and less fanciful designs as it does in the more elaborate patterns. Your requirements can most surely be perfectly met with "RICHMOND" products — there is no sacrifice of quality in the moderate as compared with the elaborate.

"RICHMOND"



Plate E 640

"RICHMOND" Porcelain Enameled Lavatory with Slab, Apron, "D" Pattern Bowl, Overflow and Back all in one piece, with Concealed Wall Hanger, Nickel-plated Waste Plug, Coupling and Rubber Stopper.

	Dimensions
Length	21 inches
Height of Back	8 inches
Bowl	11 x 14 inches
Depth	18 inches
Plate E640, enameled exterior, less all Nickel-plated Fittings	\$10.25
If with Enameled Brackets, add per pair	1.00



Plate E 650

"RICHMOND" Porcelain Enameled Lavatory, with Slab, Oval Bowl, Overflow and Back all in one piece, with Concealed Wall Hanger, Nickel-plated Waste Plug, Coupling, Chain Stay, Chain and Rubber Stopper.

	Dimensions
Slab	16 x 20 inches
Slab	18 x 24 inches
Height of Back	10 inches
Bowl	11 x 14 inches
Bowl	12 x 15 inches
Height of Back	10 inches
Sizes	16 x 20 18 x 24
Plate E 650, enameled inside, less all Nickel-plated Fittings	\$9.50 \$12.00



Plate E 660

"RICHMOND" Porcelain Enameled Lavatory, with Slab, "D" Pattern Bowl, Overflow and Back all in one piece, with Concealed Wall Hanger, Nickel-plated Waste Plug, Coupling and Rubber Stopper.

	Dimensions
Length	21 inches
Depth	18 inches
Bowl	11 x 14 inches
Height of Back	8 inches
Plate E660, enameled inside, less all Nickel-plated Fittings	\$7.25

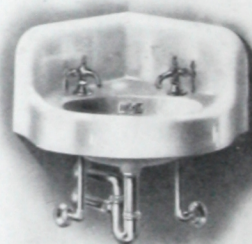


Plate E 645

"RICHMOND" Porcelain Enameled Corner Lavatory with Slab, Apron, "D" Pattern Bowl, Overflow and Back all in one piece, with Concealed Wall Hangers, Nickel-plated Waste Plug, Coupling and Rubber Stopper.

	Dimensions
Length on Side	18 inches
Bowl	11 x 14 inches
Height of Back	8 inches
Plate E645, enameled inside, less all Nickel-plated Fittings	\$10.00

"RICHMOND"



Plate E 665

"RICHMOND" Porcelain Enameled Corner Lavatory, with Slab, "D" Pattern Bowl, Overflow and Back all in one piece, with Concealed Hangers, Nickel-plated Waste Plug, Coupling and Rubber Stopper.

	Dimensions
Length on Side	17 inches
Bowl	11 x 14 inches
Height of Back	8 inches
Plate E665, enameled inside, less all Nickel-plated Fittings.....	\$7.75



Plate E 670

"RICHMOND" Porcelain Enameled Lavatory, with Slab, Oval Bowl, Overflow and Back all in one piece, with Concealed Hangers, Nickel-plated Waste Plug, Coupling and Rubber Stopper.

	Dimensions
Width	19 inches
Depth	16 inches
Bowl	10 1/2 x 13 inches
Height of Back	6 inches
Plate E670, enameled inside, less all Nickel-plated Fittings.....	\$6.50

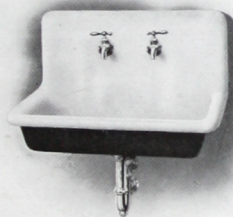


Plate E 800

"RICHMOND" Porcelain Enameled Roll Rim Sink and Back, all in one piece, with Concealed Wall Hanger, Nickel-plated Strainer, Fuller Adjustable Flange Bibbs and "P" Trap with Waste and Vent to Wall.

Wall to Center of Waste.....	6 1/2 inches
Center to Center of Faucet Holes	8 inches
Plate E800, enameled inside, less Faucets and Trap	
16x24.....	\$8.75
18x36.....	\$12.00
22x36.....	\$13.25
18x24.....	9.25
20x30.....	11.50
20x40.....	14.00
18x30.....	10.75
20x36.....	12.75
22x42.....	14.50
If with Painted Brackets instead of Hangers, add per pair.....	.50
If with Porcelain Enameled Brackets instead of Hangers, add per pair.....	1.00
If with Vented "P" Trap, add.....	5.75
If with Bibbs, add per pair.....	2.50
If with Galvanized Air Chambers, add per pair.....	2.00

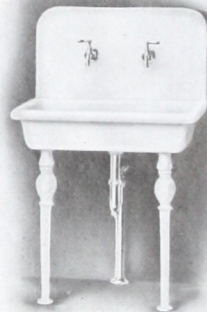


Plate E 812

"RICHMOND" Porcelain Enameled Roll Rim Sink and 15-inch Porcelain Enameled Back, with Legs, Nickel-plated Strainer, Fuller Adjustable Flange Bibbs and "P" Trap with Waste to Floor and Vent to Wall.

From Wall to Center of Waste, 7 inches	
Plate E812, enameled exterior, less Faucets and Trap	
16 x 24.....	\$ 9.25
18 x 24.....	9.75
18 x 30.....	11.25
18 x 36.....	12.50
20 x 30.....	12.00
20 x 36.....	13.25
20 x 40.....	14.50
22 x 36.....	13.75
22 x 42.....	15.00
If with Vented "P" Trap, add.....	5.75
If with Bibbs, add per pair.....	2.50
If with Air Chambers, add per pair.....	2.00

"RICHMOND"

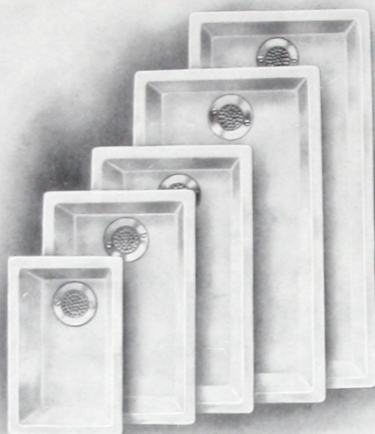


Plate E 850

"RICHMOND" Porcelain Enameled Regular Flat Rim Kitchen Sinks, with Nickel-plated Strainers, Bolts, Nuts and Couplings.

Note.—Sinks are furnished with Enameled Rims and Rounded Corners.

16 x 24.....	\$3.25
16 x 30.....	3.90
18 x 24.....	3.50
18 x 30.....	4.25
18 x 32.....	4.65
18 x 36.....	4.75
20 x 28.....	4.00
20 x 30.....	4.50
20 x 36.....	5.25
20 x 40.....	5.75
20 x 42.....	6.00
20 x 48.....	6.75
If with Overflow, add each.....	1.50
If with Overflow and Plug Strainer, add each.....	2.00



Plate E 860

"RICHMOND" Porcelain Enameled Round Corner Flat Rim Kitchen Sinks, with Nickel-plated Strainers, Bolts, Nuts and Couplings.

Note.—Sinks are furnished with Enameled Rims.

16 x 24.....	\$3.50
16 x 30.....	4.15
18 x 30.....	4.50
18 x 36.....	5.00
20 x 30.....	4.75

How to Order "Richmond" Porcelain Enameled Ware

You can secure "RICHMOND" Porcelain Enameled Ware through your local plumber. After selecting the pattern you desire, specify "RICHMOND" to your plumber or contractor or ask your architect to do so.

"RICHMOND" Porcelain Enameled Ware is never sold direct to the consumer, but is sold by first-class plumbers and dealers everywhere.

Any dealer or plumber can secure "RICHMOND" goods from his wholesaler and you need simply specify "RICHMOND" and insist on accepting no substitute.

When ordering any particular pattern or piece shown in this book please mention the plate number which appears underneath each design. We ask this so as to avoid confusion.

THE McCRUM-HOWELL CO.

Two factories at Uniontown, Pa.
One at Norwich, Conn.

Park Ave. and 41st St., New York





